Costs and Returns for Crop Production in Alberta - 1985

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SUMMARY OF 1985 PRODUCTION COSTS AND RETURNS FOR CROP PRODUCTION IN ALBERTA USING THE CASE STUDY APPROACH

BY

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FOREWORD

Alberta grain farmers, like their counterparts in other provinces, are being severely squeezed by the current farm income crisis. Successive droughts in 1984 and 1985, followed by depressed world grain prices have contributed significantly to the persistent shortfall between grain income and production costs. To be sure, governments, federal and provincial, have provided much assistance to the industry, but there is a limit to what individual governments can do to resolve the current farm income problem. In the interim, grain farmers need to plan their cropping and marketing activities with greater vigilance, and strive to reduce input costs and build equity in their farming business.

Alberta Agriculture has a considerable amount of technical, financial and management information that can go a long way in helping producers plan for survival. This crop report summarizes 1985 crop costs and returns for dryland and irrigated farms in the six administrative Regions. More current information has been provided to study participants and the District Agricultural offices. We encourage farmers to avail themselves of these costs/returns information, and to use them to evaluate cropping alternatives performance and to plan for the new crop year.

Dr. Carlyle Ross
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SECTION I

COSTS OF PRODUCING GRAIN AND OILSEEDS IN ALBERTA - 1985

Introduction

The Production and Resource Economics Branch of Alberta Agriculture initiated the case study approach in the fall of 1983. As a resource group to Alberta Agriculture, primary and prospective producers, extension personnel, and agribusinesses, the Branch recognizes the need for a current and comprehensive data base on farm capital investments, material inputs, cultural practices, yields, costs and returns for all farm enterprises. In response to this need the case study approach is seen as a major resource initiative aimed at establishing a representative production costs and returns data base for major crop enterprises in each of the regions in Alberta.

Initially, a total of sixty-nine (69) grain farms situated in four of the agricultural regions in Alberta - Red Deer, Vermilion, Barrhead, and Peace River, were able to provide financial and physical data relative to the 1983 study year. A report summarizing the study results was published in January, 1985.

Following an appraisal of the 1983 study year and the general interest and enthusiasm among the participants, it was decided that the project be continued and expanded into all agricultural regions; that is, to include Calgary and Lethbridge. In addition, a second questionnaire and computer program was developed to facilitate the analysis of irrigated crop farms in the Lethbridge region. A report summarizing the 1984 study results was published in July, 1986.

This report summarizes 1985 costs and returns data for dryland crops in all six agricultural regions in Alberta as well as for irrigated crops in the Lethbridge region. The study results are based on a total of 167 farms, of which 123 were dryland and the remaining 44 were irrigated.

Objectives

The primary objective of this report is to provide extension personnel and the general public with factual costs of production information for grain and oilseed crops. Other objectives are as follows:

1. To obtain and document current and actual production costs for the main grain and oilseed crops grown in Alberta.
2. To document detailed input/output and costs/returns data for crop enterprises for the six farming regions in Alberta and the total province.
3. To provide each study participant with accurate and detailed costs/returns information on an enterprise and whole farm basis.
4. To provide each study participant with a comparative interpretation of their crop enterprises relative to the total group studied in their region.
5. To regularly monitor and periodically update the above data base.
6. To establish and maintain contact with the farming community and to be able to respond promptly to the needs of producers.
7. To provide headquarter staff, agribusinesses, and the extension field staff with current, accurate, and comprehensive information.

Study Sample and Survey Method

Participants for the 1985 study year were selected by the various District Agriculturists on the basis of several criteria developed by the Regional Economist and the Regional Farm Management Planning Committee. Factors considered in the selection of farms included farm size, crop rotation, availability of accurate records, level of input use, soil type, etc. Before committing the farms for study, the selected participants were contacted by the District Agriculturists who briefed

them as to the study objectives and the information they would be asked to provide.

The questionnaire which was used to gather the information contained two sections. Section I was a record of all investment items and cash expenditures associated with the farm and was similar to the information required for income tax purposes. Section II was designed to record data specific to each crop enterprise, that is, acres, yield, input costs, returns, etc.

Study participants were contacted after harvest in order to arrange a personal visit for the purpose of completing the two page questionnaire. After analyzing the raw data, the preliminary results and group averages were personally delivered to the participants in order to be reviewed and revised if necessary. Many Districts Agriculturists participated in the study by accompanying the enumerator during the data collection and data dissemination stages. By April, 1986, all of the final individual results and group averages were returned to the participants so that they could be used in the preparation of budgets and plans for the 1986 crop year. Summary results were also mailed to the various extension personnel in order to update their data base.

Method of Analysis

All costs and returns data presented in this report are group averages expressed on a per acre and per bushel basis. The costs shown in the summary pages were calculated for each category of expense by dividing the total of all expenses by the total number of units of production. For example, the fertilizer expense for wheat grown on five farms is calculated by adding the total fertilizer expense for each farm, and then dividing by the total wheat acreage for the five farms. Thus, the costs and returns were weighted on a per unit of production basis rather than calculated using the simple average approach. In some cases, certain cost items were not incurred in an individual operation and as such were taken into account in the method of determining the average cost.

As observed, costs varied significantly from farm to farm and across the regions and districts. This variability among farms is attributable to such factors as climate, soil type and the management skills of the farmer.

Consistent with the principles of economics, the larger scale farms reflected more efficient operations in comparison to their smaller counterparts. This is largely due to some of the larger scale farmers being able to achieve cost efficiencies by purchasing inputs in larger quantities at discount rates and using resources such as machinery and labour more efficiently. On the return side, some farmers were able to secure more advantageous marketing arrangements.

The following paragraphs contain definitions of some of the terms and concepts used in this report.

Value of Production

Crop Sales: The value of crops grown during the study year had to be estimated since normally the total harvest is not completely sold until sometime during the next calendar year. However, if the crop had been completely sold at the time of data collection the actual price received was used to determine the total income from that enterprise. Shown in Table 1A are the price estimates that were used for the 1985 crop year.

Insurance Receipts: The Alberta Hail and Crop Insurance Corporation paid out to farmers a record amount exceeding the 1984 record in lieu of shortfalls in grain and oilseed production. Drought conditions in 1985 were more widespread, prevailing in the Lethbridge, Calgary and Red Deer regions. Lower production was also reported in the Peace River region where an early snowfall caused farmers to harvest their crop the following spring. Crop yields in the Vermilion and Barrhead regions were about average in 1985. Crop insurance receipts on study farms were in the range of

0.25 per cent of the value of production in the Barrhead region to 30.28 per cent in the Lethbridge dryland areas.

Variable Costs

Labour Costs: Most study participants relied on hired labour to perform some of the necessary farming operations. The category entitled unpaid labour in the variable cost section of the summary report includes the cost of the operator, the operator's wife and child labour. The labour rates used to calculate this cost in 1985 were $6.50 per hour for the operator and $5.00 per hour for the other family members.

TABLE 1A

LIST OF GRAIN/OILSEED PRICES USED IN VALUING 1985 CROP - DRYLAND

CROP	GRADE	Price $/Bu.	Price $/Tonne
Canola	1 Can	6.50	286.59
	2 Can	5.50	242.50
	3 Can	5.17	227.95
Wheat	1 CR	4.41	162.00
	2 CR	4.26	156.50
	3 CR	3.92	144.00
	Feed	2.99	110.00
Barley	1FD	2.07	95.11
	2FD	2.05	94.11
	3FD	1.96	90.11
Oats	1FD	1.14	74.11
	2FD	1.10	71.10
Mixed Grain		1.61	89.17
Rye		2.03	80.00
Flax		5.90	260.00
Durum Wheat		4.76	175.00
Winter Wheat		4.00	147.00

TABLE 1B

LIST OF GRAIN/OILSEED PRICES USED
IN VALUING 1985 CROP - IRRIGATION

CROP	Price $/Bu.	Price $/Tonne
Soft Wheat	3.81	140.00
Barley	2.25-2.55	103.34-117.12
HY320	3.00-3.40	110.23-124.93
Barley Silage		26.00/ton
Corn Silage		23.00/ton
Alfalfa Hay		80.00-100.00/ton
Sunflowers	.15/lb.	
Dry Peas	.10-.14/lb.	
Processing Peas		347.00-393.00/ton
Grain Corn	3.08-4.00	113.17-146.98
Dry Beans	.25-.28/lb.	

Material Costs: Most supplies used in grain production were bought during the current production year and recorded as such in the year-end statement. However, it was necessary to record the inventory of many inputs such as seed, fertilizers and chemicals as these inputs might have been purchased in the previous year for use in the production year under study. An attempt was made to accurately monitor all costs and inputs used during the twelve month production period, regardless of when purchased or applied to the land. Home-grown seed was valued at market prices and entered as such in the variable costs section of the enterprise analysis.

Crop/Hail Insurance: It now appears that more grain farmers are exercising the option of acquiring crop insurance. The number of crop/hail insurance policies on grain farms was greater in some regions than others, depending upon the frequency of adverse weather conditions that seriously affect crop production. Crop/hail insurance premiums were recorded for the total farm and then allocated to the different crops according to coverage.

Machine Operating Costs: Machine operating costs consisted of fuel, oil, lube and repairs. Each study participant provided his total fuel and repair costs for the calendar year under study which was then allocated to each of the crop enterprises studied. On the average, the fuel and repair costs associated with an acre of summerfallow were approximately 45 per cent of that used on a cropped acre.

Miscellaneous Costs: Miscellaneous costs included subscriptions to farm magazines, office supplies, accounting and legal fees, etc. as well as building repairs, utilities, custom work and operating interest paid. Interest paid on operating capital was the actual amount paid by the participant during the year of study and was allocated to only the cropped acres. Utilities included heating fuel, telephone and power, and were allocated on an average basis to the various grain/oilseed enterprises.

Capital Costs

Cash Rent/Crop Share: Costs associated with the primary or fixed resources used in grain production are indicated in the capital cost section. Land represented the major part of the investment and its actual cost related to tenure and equity. Rented land used in crop production was most commonly expressed on a cash rent basis and reflected the actual market value at the time of analysis. For rented land using

a crop share arrangement, yield, price per bushel, as well as the cost of inputs were used to derive the net land cost.

Taxes and Insurance: Actual costs were recorded for land taxes and building/equipment insurance. Since these costs are associated with the ownership of capital assets, they have been included as part of the capital overhead costs.

Paid Capital Interest: The actual cost associated with owned land depended on the equity levels reported by the various farms. Beginning farmers who recently purchased their farms had high ownership costs in terms of mortgage interest as compared to established farmers. Interest on land as well as the interest paid on buildings and machinery loans were included under the heading of "Paid Capital Interest". Return to equity was also calculated since the participants had provided the market value of all of their investment as well as the amount of liabilities for each category of investment.

Depreciation: Depreciation was determined for all of the buildings and machinery that were used in grain production. In some cases, depreciation was calculated by taking a percentage of the market value that was appropriate to the grain enterprise and dividing by the estimated remaining years of useful life. Building depreciation was allocated only to the crop enterprise (on a per acre basis) while machinery depreciation was allocated to all. Depreciation cost associated with an acre of summerfallow was approximately 45 per cent of a cropped acre.

SECTION II

SUMMARY OF REGIONAL COSTS AND RETURNS FOR THE TOTAL GRAIN FARM

This section provides detailed regional costs and returns information for the average grain farm studied in 1985. The number of farms participating in this study ranged from six (6) in the Red Deer region to 44 in the Lethbridge irrigation region. The average acreage per farm under cultivation ranged from 590.11 in the Lethbridge irrigation region to 1798.86 in the Calgary (Oyen-Hanna) region. Shown in Table 2 are the costs and returns for the average grain farm studied in each region.

Value of Production

The value of production expressed on a per acre basis was derived from two sources, namely, from the value of the crop itself and from crop and hail insurance received. With 1985 representing a year of lower to average yields, crop insurance income on some farms was significantly higher in comparison to income received from crop sales. Weighted average values of production on a per cultivated acre basis ranged from $50.27 in the Calgary (Oyen-Hanna) region to $284.89 per acre in the Lethbridge irrigated region. As to the importance of crop insurance, 30.3 per cent of the value of production in the Lethbridge dryland region or $16.07 per acre was accounted for by crop insurance income.

Variable Costs

Variable cost includes all money costs that must be incurred if an enterprise is to function. Variable costs generally represent approximately 60 per cent of the total production costs. Of major importance are the costs for material inputs, labour and machine operation. Table 2A presents a detailed breakdown of the cost items comprising the total variable cost.

Seed, fertilizer, and chemical costs on dryland ranged from a low of $12.77 per acre in the Calgary (Oyen-Hanna) region to $40.90 per acre in the Barrhead region on a total farm basis. For the Lethbridge irrigation region this cost amounted to $63.88 per acre. The total variable costs on dryland farms ranged from $34.50 in the Calgary (Oyen-Hanna) region to $83.48 per acre in the Barrhead region. A variable cost of $195.63 per acre was observed for the Lethbridge irrigation region.

Value of production less the total variable cost equals return to capital or contribution margin. The return to capital is the residual to cover the capital cost associated with land, machinery and building investment. Contribution margins are often used by producers to compare the profitability of various crops. As Table 2A shows, return to capital on dryland farms ranged from $5.87 per acre in Lethbridge region to $83.74 per acre in the Barrhead region. Returns to capital on irrigation farms in the Lethbridge region averaged $89.26 per acre.

Capital Costs

Costs associated with the primary or fixed resources used in grain production are indicated in the capital cost section of Table 2. The actual cost of land will depend on the tenure and equity position established by the operator. For example, some operations on the study indicated a 100 per cent equity and no rented land, thereby resulting in no actual cost incurred for land. At the other extreme were those operations with high interest payments associated with land that was purchased on terms. The cash rent/crop share values reported reflect

market prices and are spread out over all acres farmed. These values ranged from $1.70 per acre in the Calgary (Oyen-Hanna) region to $15.59 per acre in the Barrhead region. Taxes and insurance on dryland farms which are associated with the ownership of fixed resources are reported separately, ranging from $1.59 per acre in the Calgary (Oyen-Hanna) region to $3.37 per acre in the Red Deer region. Water and land taxes in the Lethbridge irrigation region averaged $15.96 per acre. Building and equipment depreciation on dryland farms based on market value ranged from $13.09 per acre in the Lethbridge region to $26.61 per acre in the Barrhead region. The lower depreciation cost in the Lethbridge region is a result of their lower investment in machinery/buildings which in 1985 was $147.57 per acre compared to that of $300.00 per acre in the Barrhead region. The average market values for land by region as reported by study participants along with machinery and building investment are shown in Table 2B.

Interest payments associated with the ownership of capital resources namely land, machinery and buildings are shown as a separate entry entitled paid capital interest. As a matter of interest, the weighted average interest rate for capital loans ranged form 8.05 per cent in the Lethbridge dryland region to 10.44 per cent in the Lethbridge irrigation region. The total interest paid on capital loans on dryland farms ranged from $5.33 per acre in the Lethbridge dryland region to $13.24 per acre in the Red Deer region. The paid capital interest for the Lethbridge irrigation group was $41.20 per acre which is directly related to the high investment and the relatively lower equity level of 72 per cent. To summarize, total capital costs which include cash rent/crop share, taxes and insurance, equipment and building depreciation, and paid capital interest on dryland farms ranged from $24.26 per acre for the Calgary (Oyen-Hanna) region to $53.98 per acre for the Barrhead region. Capital costs on irrigation farms averaged $127.15 per acre.

TABLE 2

REGIONAL COMPARISON OF COSTS AND RETURNS ON CROP FARMS - 1985

REGION	PEACE RIVER	BARRHEAD	VERMILION	RED DEER	CALGARY (OYEN-HANNA)	LETHBRIDGE (DRYLAND)	LETHBRIDGE (IRRIGATION)
Number of Farms	6	24	34	18	7	34	44
Average Farm Size (Acres)	914.60	1368.46	1216.94	1291.67	1798.86	1057.56	590.11
				-Dollars Per Acre-			
Crop Sales	89.51	166.80	102.92	88.07	45.63	36.99	280.84
Insurance Receipts	10.38	0.42	1.92	17.55	4.63	16.07	4.05
VALUE OF PRODUCTION	99.89	167.21	104.84	105.62	50.27	53.07	284.89
VARIABLE COST							
Materials	29.16	40.90	33.35	39.18	12.77	14.32	63.88
Hail/Crop Insurance	3.12	3.59	3.35	5.88	2.03	3.14	10.15
Fuel and Repairs	15.82	15.42	14.95	13.88	9.53	11.10	50.06
Paid Labour	2.32	3.02	2.62	3.39	1.10	0.83	2.75
Operator Labour	8.68	12.34	12.39	9.18	6.00	9.29	31.61
Miscellaneous	7.49	8.21	6.62	10.76	3.07	8.51	37.18
TOTAL VARIABLE COST	66.59	83.48	73.28	82.27	34.50	47.19	195.63
CAPITAL COST							
Cash Rent/Crop Share	6.12	15.59	11.66	11.92	1.70	4.62	11.93
Taxes and Insurance	3.06	3.06	3.12	3.37	1.59	2.63	15.96
Equip., Bldg. Depreciation	22.16	26.61	23.56	23.06	14.75	13.09	58.07
Paid Capital Interest	7.17	8.71	9.20	13.24	6.23	5.33	41.20
TOTAL CAPITAL COST	38.51	53.98	47.53	51.59	24.26	25.66	127.15
TOTAL COST	105.10	137.45	120.81	133.85	58.76	72.85	322.78
Return to Capital (Cont. Margin)	33.30	83.74	31.56	23.36	15.77	5.87	89.26
Return to Equity	-5.20	29.76	-15.97	-28.23	-8.50	-19.79	-37.89
Return to Equity (%)	-1.30	5.24	-3.42	-5.46	-2.51	-4.49	-3.76
Equity	84%	84%	83%	79%	82%	87%	72%
Debt Capacity ($/Ac)	164.33	443.26	114.29	54.96	84.99	-9.32	417.99
Productive Value of Land ($/Ac)	22.25	453.37	6.32	-67.98	-19.25	-100.60	9.04
Market Value of Land ($/Ac)	332.67	755.33	479.60	588.11	320.59	513.51	949.66
Machinery Investment ($/Ac)	196.17	232.16	210.39	202.68	132.02	114.15	534.53

TABLE 2A

BREAKDOWN OF VARIABLE COSTS ON CROP FARMS BY REGION - 1985

REGION	PEACE RIVER	BARRHEAD	VERMILION	RED DEER	CALGARY (OYEN-HANNA)	LETHBRIDGE (DRYLAND)	LETHBRIDGE (IRRIGATION)
				-Dollars Per Acre-			
Crop Sales	89.51	166.80	102.92	88.07	45.63	36.99	280.84
Insurance Receipts	10.38	0.42	1.92	17.55	4.63	16.07	4.05
VALUE OF PRODUCTION	99.89	167.21	104.84	105.62	50.27	53.07	284.89
VARIABLE COSTS							
Seed	6.94	5.98	5.68	5.48	3.26	4.23	13.03
Fertilizer	15.73	22.52	18.17	21.99	3.31	6.09	36.63
Chemicals	6.49	12.40	9.50	11.71	6.20	4.00	14.22
Hail/Crop Insurance	3.12	3.59	3.35	5.88	2.03	3.14	10.15
Fuel	8.41	9.40	8.67	7.79	4.51	6.15	31.83
Repairs - Machine	7.41	6.02	6.28	6.09	5.02	4.95	18.23
Repairs - Building	0.86	0.90	0.90	1.44	0.24	0.82	1.96
Utilities	1.75	1.55	1.60	1.50	0.83	1.24	2.94
Custom Work	0.93	2.52	1.40	1.00	0.29	2.43	19.00
Miscellaneous	1.65	1.66	1.43	2.23	0.98	1.13	4.51
Operating Interest Paid	2.30	1.57	1.29	4.59	0.74	2.88	8.77
Paid Labour	2.32	3.02	2.62	3.39	1.10	0.83	2.75
Family and Operator Labour	8.68	12.34	12.39	9.18	6.00	9.29	31.61
TOTAL VARIABLE COST	66.59	83.48	73.28	82.27	34.50	47.19	195.63
Return to Capital or Contribution Margin	33.30	83.74	31.56	23.36	15.77	5.87	89.26

Total Production Cost

Total production cost was obtained by summing the total variable cost and the total capital cost. From Table 2, total cost production on dryland farms ranged from $58.76 per acre in the Calgary (Oyen-Hanna) region to $137.45 in the Barrhead region. Total cost production on irrigation farms averaged $322.78 per acre.

The large variation in per acre cost production on a total farm basis is attributable to factors such as cropping percentage, investment levels, equity position, level of input use, and land tenure. To elaborate, the farms in the Calgary (Oyen-Hanna) region cropped 67 per cent of the cultivated acreage in comparison to the 92 per cent cropped in the Barrhead region. This lower cropping percentage will result in lower material costs, labour costs, machine operation costs and machine/building investment. Material, fuel and repairs, and labour costs averaged $29.40 per acre on the (Calgary) Oyen-Hanna farms in comparison to $71.68 in the Barrhead region, a difference of 144 per cent. As to land tenure, the average farm in the Barrhead region owned 48 per cent of the land farmed in comparison to 79 per cent in the Calgary (Oyen-Hanna) region. This along with the higher land values and productivity in the Barrhead region accounts for the high cash rent/crop share of $15.59 per acre as compared to $1.70 in the Calgary (Oyen-Hanna) region. Total investment (land, buildings, machinery) for the Calgary (Oyen-Hanna) farms averaged $483.65 per acre in comparison to $1576.52 per acre for the Lethbridge irrigation farms.

Evaluating the Performance of Grain Farms

The performance of any grain farm must be constantly monitored if the best returns are to be achieved from the resources employed. To do this, a number of parameters have been established which, if adhered to, results in a successful enterprise.

TABLE 2B

SUMMARY OF INVESTMENT BY REGION - 1985

REGION	PEACE RIVER	BARRHEAD	VERMILION	RED DEER	CALGARY (OYEN-HANNA)	LETHBRIDGE (DRYLAND)	LETHBRIDGE (IRRIGATION)
	-Dollars Per Acre-						
Buildings	50.91	67.84	50.34	55.80	31.04	33.42	92.33
Machinery	196.17	232.16	210.39	202.68	132.02	114.15	534.53
Land (Market Value)	332.67	755.33	479.60	588.11	320.59	513.51	949.66
TOTAL	579.75	1055.33	740.33	846.59	483.65	661.08	1576.52

Perhaps one of the best indicators used in evaluating performance is that of the return to capital otherwise known as the contribution margin. Simply defined, the contribution margin is that amount which is left over after the total variable cost has been deducted from the value of production. Should this value ever become negative this implies that the enterprise is failing. That is, the value of production generated is insufficient to cover the total variable cost incurred, thus resulting in a loss. From Table 2A, it is quite evident that all of the regions were covering their total variable cost. Of all the regions studied, the highest contribution margin on a per acre basis was attained by the Lethbridge irrigation region which amounted to $89.26. Regarding the dryland regions, the return to capital ranged from $5.87 per acre in the Lethbridge dryland area to $83.74 per acre in the Barrhead region.

Another indicator used to measure performance is that of the return to equity or profit. Return to equity may be defined as that residual which is left over for future investment after all production costs have been deducted. Referring to Table 2, the Barrhead region experienced a positive return to equity in 1985 of $29.76 per acre or 5.24 per cent. The farms in the other regions were short in covering all production costs with the shortfall ranging from $5.20 per acre in the Peace River region to $37.89 per acre in the Lethbridge irrigation region.

Also shown in Table 2 is the debt capacity which is the amount of debt the farm can support based on the performance of the farm in 1985. It is calculated by summing the return to equity, the paid capital interest and depreciation, the total of which is amortized over a period of 15 years at 12 per cent. It should be noted that in the calculation of debt capacity no consideration was given to income tax. Debt capacity ranged from -$9.32 per acre in the Lethbridge dryland region to over $400.00 per acre in the Barrhead region and Lethbridge irrigation region, implying that farms in the latter two regions were in a much better financial position to service a larger debt load when compared to the remaining five regions studied.

Given as well in Table 2 is the productive value of land. The productive value of land is different from its market value in that it is a derived value based upon the performance of agriculture land with respect to net returns from grain production. Essentially, it is calculated by summing the return to equity, paid capital interest (land loan portion only) and cash rent-crop share, the total of which is amortized over 25 year at 10 per cent. Productive land values tend to approach or exceed their market value in years when yields are exceptionally high. However, in 1985 when yields were generally below average the productive land values were well below the reported market values. For example, the Lethbridge irrigation region reported the highest market value for land at $949.66 per acre while its actual productivity value was $9.04 per acre. On the other hand, this difference was somewhat smaller for the Barrhead region which reported an average market value of $755.33 per acre and a productive land value of $453.37 per acre. For the Vermilion region, the productive value of land was $6.32 per acre while the market value was $479.60 per acre. Due to the drought conditions which were experienced in the Lethbridge dryland, Red Deer, and Calgary (Oyen-Hanna) regions in 1985, there was no return to land.

Average machinery investment among the dryland regions varied by over $100.00 per acre ranging from $114.15 in the Lethbridge dryland region to $232.16 per acre for the Barrhead region (see Table 2B). Generally speaking, average machinery investment on dryland farms decreased as one moved southward across the province. The average machinery investment on irrigation farms in the Lethbridge region was $534.53 per acre.

SECTION III

SUMMARY OF COSTS AND RETURNS FOR DRYLAND CROPS SURVEYED

This section provides detailed costs and returns information on a regional basis for the various dryland crops analyzed in 1985. Costs and returns data presented in this section are based on the information collected from 123 dryland farms. As a cautionary note, some regions are more represented than others and therefore it is difficult to compare yield and cost data among the regions. Wheat was the most extensively grown crop on the average farm studied, accounting for 39 per cent of the cultivated acres. The table below shows the main crops grown and their respective acres for the average farm on a regional basis. Shown as well are the summerfallow acres in each region. Wheat production in the three southern regions accounted for 30.1, 51.2, and 58.9 per cent of the total cultivated acres in the Red Deer, Calgary (Oyen-Hanna) and Lethbridge regions, respectively, compared to less than 33 per cent in the other three regions.

TABLE 3

DRYLAND CROPPING PATTERN BY REGION - 1985

	WHEAT	BARLEY	CANOLA	OATS/HAY	SUMMERFALLOW	TOTAL
	Acres Per Farm					
Peace River	463.19	81.12	199.00	-	171.29	914.60
Barrhead	178.34	670.90	297.33	109.95	111.94	1368.46
Vermilion	425.08	247.21	335.03	12.47	197.15	1216.94
Red Deer	388.39	365.04	320.35	29.56	188.33	1291.67
Calgary (Oyen-Hanna)	921.76	64.57	148.14	78.29	586.10	1798.86
Lethbridge Dryland	623.18	51.97	40.59	-	341.82	1057.56
AVERAGE	499.99	246.80	223.41	38.38	266.11	1274.68

With respect to the four main crops - wheat, barley, oats, canola - barley production (6.150 million acres) in 1985 Alberta was second to wheat (7.550 million acres) in terms of acres seeded and accounted for 36.2 per cent of the area seeded to this crop. The average dryland farm on study in 1985 grew 246.80 acres of barley representing 19.4 per cent of the total cultivated area. Barley production was the main crop grown in the Barrhead region with the average farm reporting 670.90 acres or 49.03 per cent of cultivated area.

Canola production (2.820 million acres) in Alberta ranked third in 1985 and represented 15.4 per cent of the area seeded to the four main crops mentioned. On a regional basis, canola production was second in terms of acres seeded in the Peace River, Barrhead, and Vermilion regions representing 21.8, 21.7, and 27.5 per cent of the cultivated area, respectively.

The summerfallow acres (4.350 million acres) as a proportion of the total cultivated acres ranged from a low of 8.2 per cent in the Barrhead region to a high of 32.6 per cent in Calgary (Oyen-Hanna).

Wheat Production

Like the previous year, extreme variation in growing conditions were observed within the Province in 1985 resulting in a wide range of yields obtained. Shown in Table 4 are costs and returns data for wheat production by region. Average wheat yields in 1985 ranged from a low of 14.39 bushels in the Lethbridge dryland region to 49.99 bushels in the Barrhead region. The crop sales value per acre ranged from $58.93 in the Lethbridge dryland area to $180.57 in the Barrhead region. Crop Insurance receipts were quite significant in the Lethbridge dryland region averaging $24.67 per acre or 29.5 per cent of the value of production.

TABLE 4

REGIONAL COMPARISON OF COSTS AND RETURNS FOR WHEAT PRODUCTION - 1985

REGION	PEACE RIVER	BARRHEAD	VERMILION	RED DEER	CALGARY (OYEN-HANNA)	LETHBRIDGE DRYLAND
Number of Enterprise	9	15	61	25	20	34
Average Acreage	257.33	237.35	236.93	279.64	302.47	248.09
Average Yield (Bu./Acre)	32.00	49.99	32.93	23.97	16.20	14.39
			-Dollars Per Acre-			
Crop Sales	90.92	180.57	120.25	89.51	76.57	58.93
Insurance Receipts	19.41	0.70	0.71	11.81	7.01	24.67
VALUE OF PRODUCTION	110.33	181.27	120.96	101.32	83.58	83.60
	3.45/Bu.	3.63/Bu.	3.67/Bu.	4.23/Bu.	5.16/Bu.	5.81/Bu.
VARIABLE COST						
Materials	35.83	48.61	37.76	42.52	17.56	19.85
Hail/Crop Insurance	3.79	2.96	3.32	4.44	2.88	5.02
Fuel and Repairs	17.80	16.68	15.70	12.95	12.61	14.78
Paid Labour	2.54	2.80	2.86	4.00	1.36	1.28
Operator Labour	9.73	12.62	13.73	8.89	7.86	12.99
Miscellaneous	8.06	7.12	6.92	10.90	3.98	10.59
TOTAL VARIABLE COST	77.75	90.79	80.29	83.70	46.25	64.51
	2.43/Bu.	1.82/Bu.	2.44/Bu.	3.49/Bu.	2.85/Bu.	4.48/Bu.
CAPITAL COST						
Cash Rent/Crop Share	9.77	13.79	10.27	13.94	1.96	3.61
Taxes and Insurance	2.37	3.27	3.28	3.01	1.65	3.07
Equip., Bldg. Depreciation	22.70	27.24	26.01	21.42	18.76	19.25
Paid Capital Interest	7.23	8.95	8.90	12.50	7.00	5.57
TOTAL CAPITAL COST	42.07	53.26	48.47	50.87	29.37	31.50
TOTAL COST	119.81	144.05	128.75	134.57	75.62	96.07
	3.74/Bu.	2.88/Bu.	3.91/Bu.	5.61/Bu.	4.67/Bu.	6.67/Bu.
Return to Capital (Cont. Margin)	32.58	90.48	40.67	17.62	37.34	19.09
Return to Equity	-9.49	37.22	-7.80	-33.25	7.96	-12.41
Return to Equity (%)	-2.79	6.87	-1.53	-8.31	2.06	-2.31
Equity	81%	82%	84%	77%	84%	89%
Debt Capacity ($/Ac)	139.20	500.04	184.71	4.56	229.63	84.50
Productive Value of Land ($/Ac)	17.73	510.60	60.34	-112.67	139.53	-42.58
Market Value of Land ($/Ac)	335.97	758.55	477.83	466.09	320.37	500.49
Machinery Investment ($/Ac)	197.61	240.44	231.14	185.15	164.96	164.47

Significant variation was observed in the variable cost section with material inputs being the largest ranging from $17.56 in the Calgary (Oyen-Hanna) region to $48.61 in the Barrhead region. Fuel and repair costs associated with machine operation were highest in the Peace River region at $17.80 per acre and in general, decreased when moving south across the province. Although the Barrhead region had the highest total variable cost at $90.79 per acre, their above average yields resulted in the lowest per bushel cost at $1.82. The Calgary (Oyen-Hanna) region had the lowest per acre variable cost at $46.25 or $2.85 per bushel produced.

Capital cost for wheat production ranged from $29.37 per acre in the Calgary (Oyen-Hanna) region to $53.26 in the Barrhead region. The items contributing to this difference were the value of cash rent/crop share at $13.79 per acre (due to a greater degree of rented land within the Barrhead study group) and the high machinery investment at $240.44 per acre resulting in the highest depreciation. The Lethbridge dryland group with their high equity of 89 per cent had the lowest paid capital interest cost of $5.57 per acre.

Total production costs for wheat production ranged from a low of $75.62 per acre ($4.67 per bushel) in the Calgary (Oyen-Hanna) area to $144.05 per acre ($2.88 per bushel) in the Barrhead region. Return to capital (contribution margin) ranged from $17.62 per acre in the Red Deer region to $90.48 per acre in the Barrhead region. The Calgary (Oyen-Hanna) and Barrhead regions were exclusive in experiencing returns to equity in the order of 2.06 and 6.87 per cent, respectively. Returns were short of covering all production costs in remaining four regions with shortfalls ranging from $7.80 per acre in the Vermilion region to $33.25 per acre in the Red Deer region. Refer to Table 4 for more details on debt capacity, market and productive values for land and machinery investments.

Barley Production

Referring to Table 5, barley yields in 1985 ranged from 19.25 bushels in the Lethbridge dryland region to 75.90 bushels in the

TABLE 5

REGIONAL COMPARISON OF COSTS AND RETURNS FOR BARLEY PRODUCTION - 1985

	PEACE RIVER	BARRHEAD	VERMILION	RED DEER	LETHBRIDGE (DRYLAND)
Number of Enterprise	4	48	42	26	12
Average Acreage	101.40	335.45	200.12	252.72	147.25
Average Yield (Bu./Acre)	55.60	75.90	45.19	43.08	19.25
	- - - - - - - - - - - - - - - -Dollars Per Acre- - - - - - - - - - - - - - - -				
Crop Sales	103.98	171.35	91.69	91.25	44.32
Insurance Receipts	-	0.42	2.12	15.87	36.61
VALUE OF PRODUCTION	103.98	171.77	93.82	107.12	80.93
	1.87/Bu.	2.26/Bu.	2.08/Bu.	2.49/Bu.	4.20/Bu.
VARIABLE COST					
Materials	32.95	43.89	38.57	46.51	23.91
Hail/Crop Insurance	1.93	3.63	2.91	7.58	4.82
Fuel and Repairs	16.54	16.66	17.33	17.64	14.97
Paid Labour	2.83	3.52	2.95	3.34	1.52
Operator Labour	9.45	13.68	13.54	10.91	19.11
Miscellaneous	10.77	8.86	7.04	13.98	8.36
TOTAL VARIABLE COST	74.47	90.24	82.34	99.96	72.69
	1.34/Bu.	1.19/Bu.	1.82/Bu.	2.32/Bu.	3.78/Bu.
CAPITAL COST					
Cash Rent/Crop Share	3.40	17.54	11.99	9.54	5.87
Taxes and Insurance	3.85	2.90	3.25	4.40	3.20
Equip., Bldg. Depreciation	32.57	29.20	26.66	30.17	21.66
Paid Capital Interest	9.80	8.45	9.95	12.51	8.52
TOTAL CAPITAL COST	49.62	58.09	51.85	56.63	39.25
TOTAL COST	124.09	148.32	134.19	156.68	111.94
	2.23/Bu.	1.95/Bu.	2.97/Bu.	3.64/Bu.	5.82/Bu.
Return to Capital (Cont. Margin)	29.51	81.54	11.48	7.16	8.24
Return to Equity	-20.11	23.45	-40.37	-49.46	-31.07
Return to Equity (%)	-3.72	4.04	-8.70	-6.99	-5.34
Equity	86%	87%	82%	83%	87%
Debt Capacity ($/Ac)	151.59	416.13	-25.64	-46.17	-5.68
Productive Value of Land ($/Ac)	-139.23	409.38	-210.28	-274.90	-162.50
Market Value of Land ($/Ac)	311.54	761.04	467.65	724.04	587.58
Machinery Investment ($/Ac)	287.14	251.86	236.22	267.94	184.04

Barrhead region. The value of production on a per acre basis ranged from $80.93 on the Lethbridge dryland region to $171.77 in the Barrhead region. Crop insurance receipts were significant in the Lethbridge dryland region averaging $36.61 per acre or 45.2 per cent of the value of production. In contrast to wheat production, the range of variable costs for barley production was somewhat lower, ranging from $72.69 in the Lethbridge dryland region to $99.96 in the Red Deer region. Due to the large variation in barley yields variable costs on a per bushel basis ranged from $1.19 in the Barrhead region to $3.78 in the Lethbridge dryland region.

Capital costs for barley production ranged from $39.25 in the Lethbridge dryland region to $58.09 in the Barrhead region. In addition, the Barrhead region reported the highest cash rent/crop share and depreciation costs. Paid capital interest was relatively high in the Red Deer region at $12.51 per acre. Total production costs ranged from $111.94 ($5.82 per bushel) in the Lethbridge dryland region to $156.68 ($3.64 per bushel) in the Red Deer region. With respect to barley production only the Barrhead region was able to cover all production costs. Their return to equity was $23.45 per acre (4.04 per cent). All other regions reported production costs exceeding returns ranging from $20.11 per acre in the Peace River region to $49.46 per acre in the Red Deer region. The range in equity levels for farms with barley production ranged from 82 per cent in the Vermilion region to 87 per cent in the Barrhead and Lethbridge dryland regions. Machinery investment ranged from $184.04 per acre in the Lethbridge dryland region to $287.14 in the Peace River region.

Canola Production

Group average costs and returns data on canola production are shown in Table 6. At a regional level, canola yields in 1985 ranged from 8.83 bushels in the Lethbridge dryland region to 32.05 bushels in the Barrhead region. The value of production for the Calgary (Oyen-Hanna) farms averaged $83.46 compared to the $208.63 per acre

TABLE 6

REGIONAL COMPARISON OF COSTS AND RETURNS FOR CANOLA PRODUCTION - 1985

REGION	PEACE RIVER	BARRHEAD	VERMILION	RED DEER	CALGARY (OYEN-HANNA)	LETHBRIDGE DRYLAND
Number of Enterprise	8	32	63	28	4	9
Average Acreage	124.37	22.3	180.81	205.94	84.25	153.33
Average Yield (Bu./Acre)	21.00	32.05	22.75	19.59	13.00	8.83
			-Dollars Per Acre-			
Crop Sales	141.97	208.03	139.22	116.36	83.46	45.03
Insurance Receipts	2.53	0.60	4.47	28.04	-	44.30
VALUE OF PRODUCTION	144.50	208.63	143.69	144.40	83.46	89.33
	6.88/Bu	6.51/Bu	6.32/Bu	7.37/Bu	6.42/Bu	10.12/Bu
VARIABLE COST						
Materials	31.35	50.82	39.95	44.30	29.98	37.38
Hail/Crop Insurance	4.55	5.32	5.58	9.13	-	6.10
Fuel and Repairs	16.92	16.79	15.97	15.04	13.64	13.22
Paid Labour	2.93	2.94	2.76	3.57	-	0.51
Operator Labour	8.57	12.02	13.25	10.04	10.82	14.88
Miscellaneous	8.61	10.61	7.43	11.51	5.00	11.39
TOTAL VARIABLE COST	72.93	98.50	84.94	93.59	59.44	83.48
	3.47/Bu	3.07/Bu	3.73/Bu	4.78/Bu.	4.57/Bu	9.45/Bu
CAPITAL COST						
Cash Rent/Crop Share	3.27	21.70	15.98	15.61	13.21	20.91
Taxes and Insurance	4.09	3.13	3.22	3.42	1.57	2.95
Equip., Bldg. Depreciation	25.58	28.54	25.26	23.04	31.63	17.13
Paid Capital Interest	8.99	8.12	10.04	11.88	1.63	3.25
TOTAL CAPITAL COST	41.92	61.49	54.50	53.95	48.03	44.24
TOTAL COST	114.85	159.99	139.45	147.54	107.47	127.72
	5.47/Bu	4.99/Bu	6.13/Bu	7.53/Bu	8.27/Bu	14.46/Bu
Return to Capital (Cont. Margin)	71.57	110.13	58.75	50.81	24.02	5.84
Return to Equity	29.64	48.64	4.24	-3.13	-24.01	-38.39
Return to Equity (%)	6.30	8.43	0.91	-0.60	-5.14	-10.03
Equity	83%	87%	82%	80%	95%	91%
Debt Capacity ($/Ac)	437.27	580.96	269.37	216.49	63.00	-122.69
Productive Value of Land ($/Ac)	316.59	668.67	231.30	183.48	-98.03	-140.62
Market Value of Land ($/Ac)	325.88	745.07	477.24	601.76	300.00	562.32
Machinery Investment ($/Ac)	227.58	251.35	224.72	204.19	281.48	145.56

reported by the Barrhead farms. Crop insurance receipts for Lethbridge dryland farms represented 49.6 per cent of the value of production.

Variable costs ranged from a low of $59.44 per acre in the Calgary (Oyen-Hanna) region to $98.50 in the Barrhead region. As can be seen the need for high production relative to cost is very significant. For example, in the Lethbridge dryland region the variable cost associated with the 8.83 bushel yield was $9.45 per bushel as compared to the cost of $3.07 per bushel in the Barrhead region where the yield averaged 32.05 bushels.

Capital costs for canola production ranged from $44.24 per acre in the Lethbridge dryland region to $61.49 in the Barrhead region. Like barley production, the Barrhead region again reported the highest cash rent/crop share cost of $21.70 per acre as well as depreciation costs of $28.54 per acre. Although the Barrhead region had the highest per acre production costs, their relatively high yield gave them the lowest production costs on a per bushel basis of $4.99. As can be observed from Table 6, the three most southern regions had negative returns to equity ranging from $3.13 per acre in Red Deer to $38.39 per acre in Lethbridge dryland. The return to equity for the remaining three regions ranged from $4.24 per acre (0.91 per cent) in the Vermilion region to $48.64 per acre (8.43 per cent) in the Barrhead region. As a note of interest, the productive value of land for the canola crop in the Barrhead region was calculated to be $668.67 per acre and compares to the average market value of $745.07 per acre. Machinery investment ranged from $145.56 per acre in the Lethbridge dryland region to $281.48 per acre in the Calgary (Oyen-Hanna) region.

Oats Production

Oats are not considered a major crop on grain farms since it is more often grown on farms having livestock enterprises where it is used in the feeding program. A total of 38 farms or 28.4 per cent of the dryland study group grew oats in 1985. Data on oats production is not available for the Peace River and Lethbridge dryland regions. As

indicated in Table 3, the average acreage of oats was considerably less than the acreages for wheat, barley and canola. Provincially, in 1985 oats occupied only 10.1 per cent of the total area seeded to the four main crops. Yields in 1985 ranged from 32.0 bushels in the Calgary (Oyen-Hanna) region to 100.24 bushels in the Barrhead region (see Table 7). The value of production ranged from $51.07 in the Calgary (Oyen-Hanna) region to $215.45 in the Barrhead region.

Variable costs ranged from $45.59 in the Calgary (Oyen-Hanna) region to $77.86 in the Barrhead region. Material inputs along with machine operation and labour accounted for the higher cost observed in the Vermilion region. Variable cost on a per bushel basis in the Barrhead region was relatively low at $0.77. Capital costs were also observed to have a wide range - from $37.59 in the Calgary (Oyen-Hanna) region to $52.02 in the Barrhead region, the difference of which was attributed to paid capital interest and depreciation. Regarding returns to equity, the Barrhead region was exclusive in that it had returns exceeding production costs by $85.57 per acre. For the remaining regions negative returns were reported ranging from $3.03 in the Vermilion region to $32.12 in the Calgary (Oyen-Hanna) region. Equity level for the average Barrhead farm on study was 87 per cent while average machinery investment was $281.26 per acre.

Summerfallow Costs

As is evident from Table 3, the importance of summerfallow varied across the province. To illustrate, in relation to total cultivated acres, summerfallow occupied 8.2 per cent of the cultivated area in the Barrhead region while in the Calgary (Oyen-Hanna) and Lethbridge dryland regions it was 32.6 and 32.3 per cent respectively.

Variable costs incurred in summerfallowing (Table 8) are primarily associated with machine operation and included fuel, repairs, and labour. A recent trend to chemical weed control can be verified as several dryland farms in different parts of the province reported chemical expenses. Variable costs for the three northern regions were quite similar averaging 16.49 per acre as compared to 12.92 for the three

TABLE 7

REGIONAL COMPARISON OF COSTS AND RETURNS FOR OATS PRODUCTION - 1985

REGION	BARRHEAD	VERMILION	RED DEER	CALGARY (OYEN-HANNA)
Number of Enterprise	11	13	9	15
Average Acreage	99.45	53.00	59.11	109.60
Average Yield (Bu./Acre)	100.24	65.38	59.28	32.00
	- - - - - - - - - -Dollars Per Acre- - - - - - - - - -			
Crop Sales	215.45	115.12	93.63	51.07
Insurance Receipts	-	0.84	4.31	-
VALUE OF PRODUCTION	215.45	115.95	97.93	51.07
	2.15/Bu.	1.77/Bu.	1.65/Bu.	1.60/Bu.
VARIABLE COST				
Materials	33.79	29.49	27.15	14.48
Hail/Crop Insurance	4.36	1.16	3.36	2.91
Fuel and Repairs	16.07	18.38	17.51	12.64
Paid Labour	3.20	4.27	2.50	-
Operator Labour	13.38	15.13	12.85	9.47
Miscellaneous	7.06	7.84	7.67	6.09
TOTAL VARIABLE COST	77.86	76.27	71.04	45.59
	0.77/Bu.	1.17/Bu.	1.20/Bu.	1.42/Bu.
CAPITAL COST				
Cash Rent/Crop Share	-	-	10.05	7.33
Taxes and Insurance	5.13	4.45	3.95	2.12
Equip.,Bldg. Depreciation	32.93	27.88	24.27	24.76
Paid Capital Interest	13.97	10.38	8.69	3.38
TOTAL CAPITAL COST	52.02	42.71	46.95	37.59
TOTAL COST	129.88	118.98	118.00	83.19
	1.30/Bu.	1.82/Bu.	1.99/Bu.	2.60/Bu.
Return to Capital (Cont. Margin)	137.59	39.69	26.89	5.47
Return to Equity	85.57	-3.03	-20.06	-32.12
Return to Equity (%)	8.49	-0.48	-4.24	-8.27
Equity	87%	84%	81%	91%
Debt Capacity ($/Ac)	902.21	239.99	87.85	-27.10
Productive Value of Land ($/Ac)	867.41	36.73	-24.84	-221.00
Market Value of Land ($/Ac)	784.46	428.50	428.62	300.09
Machinery Investment ($/Ac)	281.26	241.12	208.41	215.81

southern regions. Fuel and repair costs accounted for the difference. A short term break-even yield required to cover summerfallow costs can be calculated by dividing the variable cost by the price per bushel for the crop considered.

Capital costs associated with summerfallow ranged from $12.69 per acre in the Lethbridge dryland region to $23.57 per acre in the Vermilion region. A cash rent expense was reported for four of the six regions suggesting that some cash rent agreements do not provide consideration for the summerfallow year. Machinery depreciation on an average represented 50.7 per cent of the capital cost while paid capital interest accounted for 31.5 per cent. Total summerfallow costs ranged from $25.70 per acre in the Lethbridge dryland region to $40.14 per acre in the Vermilion region.

TABLE 8

REGIONAL COMPARISON OF COSTS AND RETURNS FOR SUMMERFALLOW - 1985

	PEACE RIVER	BARRHEAD	VERMILION	RED DEER	CALGARY (OYEN HANNA)	LETHBRIDGE (DRYLAND)
Number of Enterprise	4	18	20	9	10	36
Average Acreage	178.75	104.00	158.30	211.33	410.27	322.83
Average Yield (Bu./Acre)						
	-Dollars Per Acre-					
Crop Sales						
Insurance Receipts						
VALUE OF PRODUCTION						
VARIABLE COST						
Materials	2.30	-	1.03	-	4.46	0.19
Hail/Crop Insurance						
Fuel and Repairs	7.40	7.72	6.59	5.16	4.50	5.53
Paid Labour	0.51	1.49	0.42	1.69	0.65	0.33
Operator Labour	4.69	5.61	6.06	4.70	2.75	5.05
Miscellaneous	1.71	1.45	2.48	0.98	0.86	1.91
TOTAL VARIABLE COST	16.61	16.27	16.58	12.53	13.22	13.01
CAPITAL COST						
Cash Rent/Crop Share	0.52	1.85	-	-	0.36	0.67
Taxes and Insurance	2.44	2.14	3.51	2.29	1.24	1.99
Equip., Bldg. Depreciation	8.09	10.61	10.16	7.86	5.66	6.33
Paid Capital Interest	1.90	5.28	9.90	4.17	6.34	3.70
TOTAL CAPITAL COST	12.95	19.87	23.57	14.32	13.60	12.69
TOTAL COST	29.56	36.14	40.14	26.85	26.82	25.70
Return to Capital (Cont. Margin)	-16.61	-16.27	-16.58	-12.53	-13.22	-13.01
Return to Equity	-29.56	-36.14	-40.14	-26.85	-26.82	-25.70
Equity	96%	86%	84%	89%	76%	86%
Debt Capacity ($/Ac)	-	-	-	-	-	-
Productive Value of Land ($/Ac)	-	-	-	-	-	-
Market Value of Land ($/Ac)	339.86	724.15	558.65	531.93	328.05	529.57
Machinery Investment ($/Ac)	80.88	106.07	101.58	78.57	56.56	63.26

SECTION IV

SUMMARY OF COSTS AND RETURNS FOR IRRIGATED CROPS

The crop case study was expanded in 1985 to include the irrigated areas of southern Alberta. Cost and return data presented in this section are based on information collected from 44 irrigation farms in the Lethbridge region. As Table 9 indicates, soft wheat was the most extensively grown crop in the irrigated areas followed by alfalfa hay.

TABLE 9

1985 IRRIGATED CROP ACRES

	ACRES	% OF TOTAL
Soft Wheat	390,028	40.0
Barley	146,426	15.1
Oats	11,919	1.2
Other Grains	4,704	0.5
Total Oilseeds	58,154	6.0
Total Hay	193,406	19.9
Tame Pasture & Misc. Fodder	86,403	8.9
Sugar Beets	11	-
Potatoes	17,517	1.8
Other Specialty Crops	57,220	5.8
Summerfallow	8,125	0.8
TOTAL IRRIGATED ACRES	973,913	100.0

Three crops, namely soft wheat, barley, and hay were grown on approximately 75.0 per cent of the irrigated cropland in 1985. As to the study sample, the average farm consisted of 590.1 cultivated acres of which 39.7 per cent or 234.17 acres was represented by soft wheat.

Alfalfa hay was second in importance on the study farms in terms of acres as it was grown on 6.8 per cent of the cultivated area. The average study farm had 40.2 acres of beans and 27.2 acres of barley.

Group average costs and returns for the four main crops grown in the Lethbridge irrigation area in 1985 are presented in Table 10. The value of production ranged from $222.47 per acre for barley to $391.79 per acre for dry beans. Sugar beets, a cash crop grown under contract, were not grown in 1985. As an alternative, many irrigated farmers have turned to other cash crops such as alfalfa hay and dry beans. The value of production for soft wheat was $263.55 per acre. The higher yields reported for soft wheat and barley in 1985 relative to 1984 may be attributed to the more optimum timing of cultural operation, water application, and overall management that these crops received in the absence of the sugar beet enterprise.

The variable costs of production varied just as greatly as the value of production for the four main crops ranging from $95.40 per acre for alfalfa hay to $248.44 per acre for dry beans. Due to the nature of the dry beans enterprise, relatively higher material, machinery fuel, repairs, and labour costs were reported. Together, these three inputs totalled $193.31 per acre and accounted for 77.8 per cent of the total variable costs. The variable costs of production for soft wheat and barley were $203.30 and $177.99 per acre, respectively.

Along with the high investment for land, machinery and irrigation equipment are the associated high capital costs. The range in actual capital costs per acre incurred in 1985 was $114.23 for alfalfa production to $140.76 for dry bean production. Depre iation cost in most cases was the most significant capital cost item and is related directly to the building and machinery investment as reported by the study participants. In general, the average irrigation farm on study owned 81.8 per cent of the land base thereby reducing somewhat the impact of the cash rent/crop share cost. However, on some farms the cash rent/crop share represented a major expenditure. For example, the cash rent/crop share for the farmers growing soft wheat on rented land averaged $67.66 per acre. Water and land taxes ranged from $13.15 for alfalfa production to $18.13 for dry beans. The equity levels of irrigation farms shown in Table 10 ranged from 62 per cent for dry bean

TABLE 10

SUMMARY OF COSTS AND RETURNS FOR IRRIGATED CROPS - 1985

	SOFT WHEAT	BARLEY	DRY BEANS	ALFALFA HAY
Number of Enterprise	58	14	13	28
Average Acreage	234.17	85.36	136.08	88.43
Average Yield	82.45/bu.	84.00/bu.	1535.38/lb.	3.94/ton
	- - - - - - - -Dollars Per Acre- - - - - - - -			
Crop Sales	263.26	222.47	374.16	336.50
Insurance Receipts	0.29	-	17.63	-
VALUE OF PRODUCTION	263.55	222.47	391.79	336.50
	3.20/bu.	2.65/bu.	0.26/lb.	85.41/ton
VARIABLE COST				
Materials	64.96	51.99	99.17	20.59
Hail/Crop Insurance	12.55	7.70	17.44	0.42
Fuel and Repairs	51.81	50.39	56.21	29.72
Custom Work	16.80	4.82	22.73	21.54
Paid Labour	1.88	2.58	1.14	1.66
Operator Labour	36.06	44.94	36.79	17.32
Miscellaneous	19.24	15.57	14.96	4.15
TOTAL VARIABLE COST	203.30	177.99	248.44	95.40
	2.47/bu.	2.12/bu.	0.16/lb.	24.21/ton
CAPITAL COST				
Cash Rent/Crop Share	11.02	-	11.45	15.09
Taxes and Insurance	16.34	17.51	18.13	13.15
Equip., Bldg. Depreciation	60.30	71.31	55.58	52.43
Paid Capital Interest	43.67	32.00	55.59	33.57
TOTAL CAPITAL COST	131.33	120.81	140.76	114.23
TOTAL COST	334.63	298.80	389.20	209.63
	4.06/bu.	3.56/bu.	0.25/lb.	53.21/ton
Return to Capital (Cont. Margin)	60.25	44.47	143.35	241.10
Return to Equity	-71.08	-76.34	2.59	126.87
Return to Equity (%)	-6.85	-5.71	0.30	13.12
Equity	71%	80%	62%	75%
Debt Capacity ($/Ac)	223.98	183.64	774.86	1449.85
Productive Value of Land ($/Ac)	-302.69	-504.17	490.80	1534.95
Market Value of Land ($/Ac)	971.77	905.56	936.55	946.45
Machinery Investment ($/Ac)	549.55	652.75	528.32	494.03

production to 80 per cent for barley production, well below the 87 per cent observed for the Lethbridge dryland farms. This, coupled with the high investment results in a relatively significant paid capital interest cost ranging from $32.00 per acre for barley production to $55.59 per acre for dry beans.

Total production costs for soft wheat, barley, dry beans and alfalfa hay were $334.63, $298.80, $389.20 and $209.63 per acre, respectiv 'y. Of the four crops analyzed only alfalfa hay and dry beans had pos ve returns to equity. The return to equity for alfalfa hay was $126.87 per acre or 13.12 per cent. Returns were short of covering all costs for soft wheat and barley by $71.08 and $76.34 per acre, respectively. The alfalfa hay crop had the highest return to capital or contribution margin of $241.10 per acre. To maintain economic viability, cash costs must be covered in the short run. Returns over cash outflow for the dry beans, soft wheat and barley enterprises were $94.97, $25.28 and $39.91 per acre, respectively.

Based on market value, the estimated value of irrigated land ranged from $905.56 per acre for barley production to $971.77 for soft wheat production. Machinery investment per acre ranged from $494.03 for alfalfa hay production to $652.75 for barley production.

Table 11 summarizes the profitability of all crops surveyed in the Lethbridge irrigated area for which there were three or more observations, while Tables 10, 12 and 13 provide a detailed breakdown of the cost items for each of the crops. In summary, five of the 10 enterprises surveyed had positive returns to equity (profit) in 1985 with alfalfa hay being most profitable followed by corn silage. As to the sho t run break-even (cash outflow) situation, only canola was observed to have a negative cash flow of $19.38 per acre.

TABLE 11

SUMMARY OF 1985 COSTS AND RETURNS FOR IRRIGATED CROPS - LETHBRIDGE REGION

	NUMBER OF ENTERPRISES	VALUE OF PRODUCTION	VARIABLE COSTS	TOTAL COSTS	RETURN TO EQUITY ($)	RETURN OVER CASH COSTS
			Dollars Per Acre			
Soft Wheat	58	263.55	203.30	334.63	-71.08 (0)	25.28
Alfalfa Hay	28	336.50	95.40	209.63	126.87 (13.12)	196.61
Barley	14	222.47	177.99	298.80	-76.34 (0)	39.91
Dry Beans	13	391.79	248.44	389.20	2.59 (0.30)	94.97
Grain Corn	4	315.90	215.61	309.73	6.17 (0.55)	72.37
Canola	10	253.37	200.99	361.91	-108.53 (0)	-19.38
Flax	8	231.52	170.94	297.66	-66.14 (0)	13.36
Feed Wheat	4	273.47	188.29	315.55	-42.09 (0)	66.09
Corn Silage	5	394.52	260.63	355.03	39.49 (5.46)	94.53
Sunflower	5	333.69	218.31	331.23	2.45 (0.23)	66.20

TABLE 12

SUMMARY OF COSTS AND RETURNS FOR IRRIGATED CROPS - 1985

	SUNFLOWERS	CANOLA	FEED WHEAT
Number of Enterprise	5	10	4
Average Acreage	113.40	82.80	117.00
Average Yield	2140.0/lb.	42.24/bu.	91.60/bu.
	- - - - - - -Dollars Per Acre- - - - - -		
Crop Sales	333.69	253.37	273.47
Insurance Receipts	-	-	-
VALUE OF PRODUCTION	333.69	253.37	273.47
	0.16/lb.	6.00/bu.	2.99/bu.
VARIABLE COST			
Materials	71.34	73.92	66.57
Hail/Crop Insurance	11.48	12.14	16.56
Fuel and Repairs	45.31	44.88	46.84
Custom Work	58.53	12.79	10.74
Paid Labour	-	3.05	5.62
Operator Labour	15.54	33.87	24.58
Miscellaneous	16.11	20.33	17.38
TOTAL VARIABLE COST	218.31	200.98	188.29
	0.10/lb.	4.76/bu.	2.06/bu.
CAPITAL COST			
Cash Rent/Crop Share	-	8.83	11.11
Taxes and Insurance	19.65	17.85	12.11
Equip., Bldg. Depreciation	48.21	55.29	83.59
Paid Capital Interest	45.07	78.95	20.45
TOTAL CAPITAL COST	112.93	160.92	127.26
TOTAL COST	331.23	361.91	315.55
	0.15/lb.	8.57/bu.	3.44/bu.
Return to Capital (Cont. Margin)	115.38	52.38	85.18
Return to Equity	2.45	-108.53	-42.09
Return to Equity (%)	0.23	-13.61	-3.02
Equity	70%	52%	87%
Debt Capacity ($/Ac)	652.06	175.04	421.99
Productive Value of Land ($/Ac)	298.37	-302.57	-175.00
Market Value of Land ($/Ac)	1026.98	1057.85	940.17
Machinery Investment ($/Ac)	448.00	502.83	779.08

TABLE 13

SUMMARY OF COSTS AND RETURNS FOR IRRIGATED CROPS - 1985

	FLAX	GRAIN CORN	CORN SILAGE
Number of Enterprise	8	4	5
Average Acreage	97.50	187.50	211.00
Average Yield	32.00	64.00	14.46
	- - - - - - - -Dollars Per Acre- - - - - -		
Crop Sales	231.52	223.87	394.52
Insurance Receipts	-	92.08	-
VALUE OF PRODUCTION	231.52	315.90	394.52
	7.24/bu.	4.94/bu.	27.28/ton
VARIABLE COST			
Materials	62.27	81.93	101.93
Hail/Crop Insurance	2.00	16.26	1.44
Fuel and Repairs	46.17	41.96	64.96
Custom Work	8.86	41.76	36.36
Paid Labour	10.05	-	8.05
Operator Labour	23.67	20.85	17.39
Miscellaneous	17.92	12.85	30.50
TOTAL VARIABLE COST	170.94	215.61	260.63
	5.34/bu.	3.37/bu.	18.02/ton
CAPITAL COST			
Cash Rent/Crop Share	20.86	6.72	20.06
Taxes and Insurance	13.80	15.60	12.88
Equip., Bldg. Depreciation	55.83	45.34	37.65
Paid Capital Interest	36.23	26.45	23.81
TOTAL CAPITAL COST	126.72	94.11	94.40
TOTAL COST	297.66	309.73	355.03
	9.30/bu.	4.84/bu.	24.55/ton
Return to Capital (Cont. Margin)	60.58	100.28	133.89
Return to Equity	-66.14	6.17	39.49
Return to Equity (%)	-7.39%	0.55%	5.46%
Equity	74%	84%	77%
Debt Capacity ($/Ac)	176.56	530.98	687.61
Productive Value of Land ($/Ac)	-119.58	247.65	638.90
Market Value of Land ($/Ac)	954.49	934.00	797.39
Machinery Investment ($/Ac)	516.51	388.50	356.01

SECTION V

A COST COMPARISON OF SUMMERFALLOW CROPPING VERSUS STUBBLE CROPPING

As was indicated in Section III, the practice of summerfallowing varied significantly across the province in terms of its proportion of the total cultivated area. Table 3, of Section III summarized the average farm surveyed in each region as to the crop rotation including summerfallow. Summerfallow still continues to be the general practice in the dryland areas of southern Alberta. For example, the average farm in the Calgary (Oyen-Hanna) and the Lethbridge dryland areas summerfallowed 32.6 and 32.3 per cent of the cultivated area, respectively. In the northern and north-central regions, the summerfallow portion was somewhat reduced, ranging from 8.2 per cent in the Barrhead region to 18.7 per cent in the Peace River region.

The primary purpose of this section is to assist the individual producer in deciding whether stubble cropping is more advantageous than summerfallowing on his farm. The additional yield required to cover summerfallow costs in the short run and long run can be calculated by dividing the variable costs and total production costs for summerfallow, respectively, by the market price per bushel for the crop being considered. Whether additional yields can be obtained on an individual farm basis would depend on a number of factors such as management, labour, operating cash available, machinery requirements, ability to assume risk, degree of weather uncertainly, etc.

The study participants in the Vermilion, Red Deer and Calgary (Oyen-Hanna) regions were able to provide 1985 costs and returns data both by land tenure as well as by summerfallow cropping versus stubble cropping. This data which is based on a limited number of farms is presented in the following Tables 14-17.

Wheat Production on Summerfallow Versus Stubble in the Calgary (Oyen-Hanna) Region

Group average costs and returns for wheat summerfallow, wheat stubble, and summerfallow are presented in Table 14 for the Calgary (Oyen-Hanna) region. Based on the assumption that the benefits of summerfallowing are entirely utilized by the first crop, all summerfallow costs were added to the first crop grown on summerfallowed land.

The average yield for wheat grown on summerfallow was 16.52 bushels per acre, about 0.88 bushel more than the wheat grown on stubble. Value of production for wheat on summerfallow averaged $87.92 per acre compared to $72.08 for wheat on stubble.

Lower fertilizer and chemical costs reported for wheat on summerfallow were more than offset by the variable costs associated with summerfallowing. The variable cost for the two year wheat on summerfallow enterprise averaged $56.21 per acre ($3.40 per bushel) compared to $54.87 ($3.51 per bushel) for wheat on stubble. Assuming the average market price for wheat at $4.25 per bushel, the additional yield required to cover the higher variable cost is 0.32 bushel. As anticipated, the capital costs were higher for wheat on stubble at $35.51 per acre as compared to $27.06 for wheat on summerfallow. Capital costs for the 10 summerfallow enterprises averaged $13.60 per acre giving the two year wheat summerfallow enterprise a total capital cost of $40.66. The additional yield required to cover the higher capital costs associated with the wheat on summerfallow is 1.21 bushels per acre.

Total production costs for wheat on summerfallow, including the summerfallow year, was $96.87 per acre, about $6.49 more than the production costs for stubble. A break-even yield to cover the additional summerfallow costs would be 1.53 bushels per acre. As mentioned before, wheat summerfallow outyielded wheat stubble. If wheat quality and prices are assumed to similar for both enterprises, the modest yield difference observed would favour wheat on stubble. However, the study farms indicated that a higher quality wheat was harvested from the wheat on summerfallow fields resulting in an average price of $5.32 per bushel,

TABLE 14

1985 COSTS AND RETURNS COMPARISON FOR WHEAT PRODUCTION ON SUMMERFALLOW VERSUS STUBBLE - CALGARY (OYEN-HANNA) REGION

	WHEAT SUMMERFALLOW	WHEAT STUBBLE	SUMMERFALLOW
Number of Enterprises	11	7	10
Average Acreage	247.83	224.71	410.27
Average Yield (Bu/Acre)	16.52	15.64	-
	- - - - - -Dollars Per Acre- - - - - -		
Crop Sales	81.17	64.37	-
Insurance Receipts	6.74	7.71	-
Value of Production	87.92	72.08	-
5.32/Bu.	5.32/bu.	4.61/bu.	-
VARIABLE COST			
Materials	14.56	25.53	4.46
Hail/Crop Insurance	3.21	1.99	-
Fuel and Repairs	12.50	12.87	4.50
Paid Labour	1.56	0.83	0.65
Operator Labour	7.68	8.36	2.75
Miscellaneous	3.48	5.29	0.86
Summerfallow Versus Costs	13.22	-	-
TOTAL VARIABLE COST	56.21	54.87	13.22
	3.40/bu.	3.51/bu.	-
CAPITAL COST			
Cash Rent/Crop Share	0.90	4.78	0.36
Taxes and Insurance	1.47	2.13	1.24
Equip., Bldg. Depreciation	16.92	23.64	5.66
Paid Capital Interest	7.77	4.96	6.34
Summerfallow Cap. Cost	13.60	-	-
TOTAL CAPITAL COST	40.66	35.51	13.60
TOTAL COST	96.87	90.38	26.82
	5.86/bu.	5.78/bu.	-
Return to Capital (Cont. Margin)	31.71	17.21	-13.22
Return to Equity	-8.95	-18.30	-26.82
Average Annual Return	-4.48	-18.30	-

about 15 per cent higher than the $4.61 received for wheat on stubble. The value of production was insufficient in covering all production costs for both enterprises by $8.95 per acre for wheat summerfallow and $18.30 per acre for wheat stubble. On a per acre per year basis the return to equity for the wheat summerfallow enterprise is -$4.48 as compared to -$18.30 for wheat on stubble.

Canola Production on Summerfallow Versus Stubble in the Red Deer Region

A comparison of costs and returns for canola production on summerfallow and stubble in the Red Deer region is presented in Table 15. The average yield for canola summerfallow was 25.67 bushels compared to the 17.86 bushels for canola stubble. Returns for canola summerfallow were 71.2 per cent higher at $213.14 per acre relative to the wheat stubble at $124.52 per acre.

The variable costs associated with summerfallow did not vary significantly among regions. Approximately 79 per cent of the total variable cost of $12.53 per acre for summerfallow is accounted for by machine fuel, repairs and operator labour. Variable costs for canola on summerfallow over the two year period totalled $90.70, $7.35 less than the average for canola on stubble. Surprisingly, the summerfallow variable costs were more than offset by the lower input costs giving the two year enterprise a lower variable cost relative to the canola on stubble. With canola valued at $6.50 per bushel, the additional yield increase required on canola stubble to cover the additional variable cost would be 1.13 bushels. The total production for canola on summerfallow including the summerfallow year was $164.91 per acre compared to $150.28 for canola on stubble. The additional yield required to cover all additional costs associated with summerfallow was calculated to be 2.25 bushels per acre. This is well below the 7.81 bushel difference in yield reported for the canola summerfallow versus canola stubble in 1985. Returns to capital for canola on summerfallow were $123.07 compared to $26.48 for canola on stubble. This large difference in returns is partly attributed to the higher yield but more siginficantly is as a result of

TABLE 15

1985 COSTS AND RETURNS COMPARISON FOR CANOLA PRODUCTION ON SUMMERFALLOW VERSUS STUBBLE - RED DEER REGION

	CANOLA SUMMERFALLOW	CANOLA STUBBLE	SUMMERFALLOW
Number of Enterprises	6	22	-
Average Acreage	207.92	205.38	211.33
Average Yield (Bu./Acre)	25.67	17.86	
	- - - - - - - - - -	-Dollars Per Acre-	- - - - - - - - -
Crop Sales	191.30	94.69	-
Insurance Receipts	21.84	29.83	-
Value of Production	213.14	124.52	-
	8.30/bu.	6.97/bu.	-
VARIABLE COST			
Materials	33.76	47.35	-
Hail/Crop Insurance	8.04	9.45	-
Fuel and Repairs	12.45	15.78	5.16
Paid Labour	5.05	3.14	1.69
Operator Labour	11.14	9.72	4.70
Miscellaneous	7.73	12.61	0.98
Summerfallow Versus Costs	12.53	-	-
TOTAL VARIABLE COST	90.70	98.05	12.53
	3.51/bu.	5.49/bu.	12.53/bu.
CAPITAL COST			
Cash Rent/Crop Share	23.02	13.46	-
Taxes and Insurance	3.28	3.46	2.29
Equip., Bldg. Depreciation	23.61	22.87	7.86
Paid Capital Interest	9.98	12.43	4.17
Summerfallow Capital Costs	14.32	-	-
TOTAL CAPITAL COST	74.21	52.23	14.32
TOTAL COST	164.91	150.28	26.85
	6.42/bu.	8.41/bu.	-
Return to Capital (Cont. Margin)	123.07	26.48	-12.53
Return to Equity	48.86	-25.76	-26.85
Average Annual Return	24.43	-25.76	-

the higher price received for canola grown on summerfallow due to higher quality. Return to equity for canola on summerfallow was $48.86 per acre while production costs exceeded the value of production for canola on stubble by $25.75 per acre. On a per acre basis per year the return to canola on summerfallow was $24.43 compared to -$25.76 for canola on stubble.

Canola Production on Summerfallow Versus Stubble in The Vermilion Region

Although canola can be grown on stubble land many prefer to grow it on summerfallow where it is easier to attain a firm moist seedbed. A total of 38 canola enterprises were analyzed in the Vermilion region relative to the 1985 crop year. Canola on summerfallow outyielded canola on stubble by 6.54 bushels per acre. The value of production for canola on summerfallow averaged $179.17 per acre compared to $122.05 for canola on stubble (see Table 16). Once again, higher returns on a per bushel basis was observed for the canola grown on summerfallow due to the higher grades received.

The material costs for canola on summerfallow were considerably lower at $28.87 per acre compared to $45.37 per acre for canola on stubble. Total variable costs for canola on stubble exceeded canola on summerfallow by $4.49 per acre. Assuming a price for canola of $6.50 per bushel, an additional yield of 0.69 bushel per acre for canola stubble is required to cover the higher variable costs.

The two year capital cost structure for canola on summerfallow was observed to be appreciably higher in relation to canola on stubble. Capital costs for summerfallow together with high depreciation accounts for the $18.85 per acre difference. Total production costs for canola on summerfallow averaged $155.60 per acre compared to $141.24 for canola on stubble. The incremental canola yield required to cover the additional costs of summerfallowing was calculated to be 2.21 bushels per acre.

TABLE 16

1985 COSTS AND RETURNS COMPARISON FOR CANOLA PRODUCTION ON SUMMERFALLOW VERSUS STUBBLE - VERMILION REGION

	CANOLA SUMMERFALLOW	CANOLA STUBBLE	SUMMERFALLOW
Number of Enterprises	13	25	20
Average Acreage	164.46	184.92	158.30
Average Yield (Bu./Acre)	25.78	19.24	-
	- - - - - - - - -	-Dollars Per Acre-	- - - - - - - -
Crop Sales	179.17	116.52	-
Insurance Receipts	-	5.53	-
Value of Production	179.17	122.05	-
	6.95/bu.	6.34/bu.	-
VARIABLE COST			
Materials	28.87	45.37	1.03
Hail/Crop Insurance	4.64	5.92	-
Fuel and Repairs	16.36	17.03	6.59
Paid Labour	1.04	3.04	0.42
Operator Labour	12.70	14.24	6.06
Miscellaneous	8.51	7.59	2.48
Summerfallow Versus Costs	16.58	-	-
TOTAL VARIABLE COST	88.70	93.19	16.58
	3.44/bu.	4.84/bu.	-
CAPITAL COST			
Cash Rent/Crop Share	-	-	-
Taxes and Insurance	4.69	4.47	3.51
Equip., Bldg. Depreciation	31.75	26.72	10.16
Paid Capital Interest	6.89	16.86	9.90
Summerfallow Capital Costs	23.57	-	-
TOTAL CAPITAL COST	66.90	48.05	23.57
TOTAL COST	155.60	141.24	40.14
Return to Capital	90.47	28.86	-16.58
Return to Equity	23.57	-19.19	-40.14
Average Annual Return	11.79	-19.19	-

The returns to capital for canola on summerfallow was $45.24 per acre per year compared to $28.86 for canola on stubble. Due to the difference in the canola price received coupled with the yield difference, the canola on summerfallow enterprise had a positive return to equity of $23.57 per acre as compared to -$19.19 per acre for canola on stubble.

Wheat Production on Summerfallow Versus Stubble in the Vermilion Region

A comparison of costs and returns for wheat production on summerfallow and stubble in the Vermilion region is shown in Table 17. As a cautionary note, there were only seven wheat summerfallow enterprises analyzed in comparison to 28 for wheat stubble. The average yield for wheat summerfallow was 42.29 bushels compared to 33.24 for wheat stubble. With the price per bushel and crop insurance receipts being similar for both systems, the difference in value of production is strictly related to yield. The value of production for wheat summerfallow was $157.89 per acre as compared to $123.40 for wheat stubble.

Material costs for wheat on summerfallow were significantly lower at $25.66 per acre compared to $39.20 for wheat on stubble. Total variable costs for the two systems was quite similar at $84.02 for wheat summerfallow and $83.08 for wheat stubble. More significant is the cost per bushel produced which can be related to the market price. The variable costs per bushel produced under the stubble system averaged $2.50, about 26 per cent higher than the $1.99 for the summerfallow system.

The two year capital costs for wheat summerfallow averaged $65.89 in comparison to the $43.87 for wheat stubble. Higher depreciation and labour costs for the summerfallow system accounted for the difference which is also reflected in the total cost structure. Using the total cost difference of $22.96 per acre and a price of $3.70 per bushel, the incremental wheat yield required is 6.21 bushels.

Return to equity for the wheat summerfallow system averaged $3.99 per acre per year compared to -$3.55 for wheat stubble.

TABLE 17

1985 COSTS AND RETURNS COMPARISON FOR WHEAT PRODUCTION ON SUMMERFALLOW VERSUS STUBBLE - VERMILION REGION

	WHEAT SUMMERFALLOW	WHEAT STUBBLE	SUMMERFALLOW
Number of Enterprises	7	28	20
Average Acreage	124.29	307.04	158.30
Average Yield (Bu./Acre)	42.29	33.24	-
	- - - - - - - - - -Dollars Per Acre- - - - - - - - -		
Crop Sales	157.89	122.50	-
Insurance Receipts	-	.90	-
Value of Production	157.89	123.40	-
	3.73/bu.	3.71/bu.	-
VARIABLE COST			
Materials	25.66	39.20	1.03
Hail/Crop Insurance	3.52	3.48	-
Fuel and Repairs	17.48	17.32	6.59
Paid Labour	1.31	2.87	0.42
Operator Labour	15.79	14.14	6.06
Miscellaneous	3.68	6.07	2.48
Summerfallow Versus Costs	16.58	-	-
TOTAL VARIABLE COST	84.02	83.08	16.58
	1.99/bu.	2.50/bu.	
CAPITAL COST			
Cash Rent/Crop Share	-	-	-
Taxes and Insurance	4.76	4.27	3.51
Equip., Bldg. Depreciation	24.76	28.92	10.16
Paid Capital Interest	12.80	10.68	9.90
Summerfallow Capital Costs	23.57	-	-
TOTAL CAPITAL COST	65.89	43.87	23.57
TOTAL COST	149.91	126.95	40.14
Return to Capital	73.87	40.32	-16.58
Return to Equity	7.98	-3.55	-40.14
Average Annual Return	3.99	-3.55	-

SECTION VI

A COMPARISON OF CROP ALTERNATIVES BY REGION

Although most grain farms follow a rotation in their cropping program, there still remains some flexibility in deciding which crops will be grown and their respective acreages. This section is designed to present a comparison of the main crops analyzed in each of the dryland regions surveyed in 1985. For the purpose of this analysis no reference will be made to oats production as only a few enterprises were analyzed and the average acreage per farm was insignificant relative to wheat, barley, and canola production. For crop alternative data for the Lethbridge irrigation region, please refer to Section IV.

Peace River Region

Table 18 presents costs and returns data for the main crops surveyed in the Peace River region. Spring wheat production was the most significant crop as 9 enterprises averaging 257.33 acres were analyzed for the 6 farms on study.

The yields reported on the study farms were well above the averages reported for the Peace River region. Canola production proved to be the most profitable as the 21.0 bushel yield provided growers with a value of production of $144.50 per acre. Wheat production which had the highest variable cost requirements had a value of production of $110.33 per acre followed by barley at $103.98 per acre.

Variable costs per acre ranged from $72.93 per acre for canola to $77.75 for wheat production. Wheat production incurred relatively high material, fuel, repair, and labour costs.

TABLE 18

REGIONAL COMPARISON OF COSTS AND RETURNS FOR CROPS SURVEYED IN THE PEACE RIVER REGION - 1985

	SPRING WHEAT	BARLEY	CANOLA
Number of Enterprises	9	4	8
Average Acreage	257.33	101.40	124.37
Average Yield (Bu./Acre)	32.00	55.60	21.00
	-Dollars Per Acre-		
Crop Sales	90.92	103.98	141.97
Insurance Receipts	19.41	-	2.53
Value of Production	110.33	103.98	144.50
	3.45/bu.	1.87/bu.	6.88/bu.
VARIABLE COST			
Materials	35.83	32.95	31.35
Hail/Crop Insurance	3.79	1.93	4.55
Fuel and Repairs	17.80	16.54	16.92
Paid Labour	2.54	2.83	2.93
Operator Labour	9.73	9.45	8.57
Miscellaneous	8.06	10.77	8.61
TOTAL VARIABLE COST	77.75	74.47	72.93
	2.43/bu.	1.34/bu.	3.47/bu.
CAPITAL COST			
Cash Rent/Crop Share	9.77	3.40	3.27
Taxes and Insurance	2.37	3.85	4.09
Equip., Bldg. Depreciation	22.70	32.57	25.58
Paid Capital Interest	7.23	9.80	8.99
TOTAL CAPITAL COST	42.07	49.62	41.92
TOTAL COST	119.81	124.09	114.85
	3.74/bu.	2.23/bu.	5.47/bu.
Return to Capital (Cont. Margin)	32.58	29.51	71.57
Return to Equity	-9.49	-20.11	29.64
Return to Equity (%)	-2.79	-3.72	6.30
Equity	81%	86%	83%
Debt Capacity ($/Ac)	139.20	151.59	437.27
Productive Value of Land ($/Ac)	17.73	-139.23	316.59
Market Value of Land ($/Ac)	335.97	311.54	325.88
Machinery Investment ($/Ac)	197.61	287.14	227.58

The capital costs for barley production amounted to $49.62 per acre and were relatively high due to the higher depreciation costs and paid capital interest costs incurred by this particular group of farmers. Farms growing wheat had an average equity of 81 per cent compared to 86 per cent for farms with barley and 83 per cent for farms with canola. Total production costs ranged from $114.85 for canola to $124.09 for barley, a variation of 8.0 per cent.

Of the three crops surveyed, canola was the most profitable yielding returns to equity of $29.64 per acre (6.30 per cent). Production costs exceeded the value of production for barley and wheat and as such resulted in negative return to equity of $20.11 and $9.49 per acre, respectively. It is interesting to note that the productive value of land for canola production which was calculated to be $316.59 per acre approached the market value of $325.88 per acre. Average machinery investment ranged from $197.61 for wheat production to $287.14 for barley production.

Barrhead Region

Presented in Table 19 are costs and returns data for the three main crops analyzed in the Barrhead region. Yields and the associated returns for all crops surveyed were observed to be the highest in the Barrhead region in 1985. The most significant crop on the average study farm for this region was barley, accounting for 49.0 per cent of the cultivated area. In terms of value of production, barley had the lowest at $177.77 per acre while alfalfa had the highest at $209.63 per acre.

The variable cost structure for wheat and barley was quite similar averaging $90.52 per acre. Canola production incurred a variable cost of $98.50 per acre due to higher material and miscellaneous costs. Variation observed in the capital costs structure was mainly because of the variation in the cash rent/crop share cost. Total production costs ranged from $144.05 for wheat to $159.99 for canola. With such similar cost structures it can be said that the return to equity (profit) is

TABLE 19

REGIONAL COMPARISON OF COSTS AND RETURNS FOR CROPS SURVEYED IN THE BARRHEAD REGION - 1985

	SPRING WHEAT	BARLEY	CANOLA	OATS
Number of Enterprise	15	48	32	11
Average Acreage	237.35	335.45	223.00	99.45
Average Yield (Bu./Acre)	49.99	75.90	32.05	100.24
	- - - - - - - -Dollars Per Acre- - - - - - - -			
Crop Sales	180.57	171.35	208.03	215.45
Insurance Receipts	0.70	0.42	0.60	-
VALUE OF PRODUCTION	181.27	171.77	209.63	215.45
	3.63/bu.	2.26/bu.	6.51/bu.	2.15/bu.
VARIABLE COST				
Materials	48.61	43.89	50.82	33.79
Hail/Crop Insurance	2.96	3.63	5.32	4.36
Fuel and Repairs	16.68	16.66	16.79	16.07
Paid Labour	2.80	3.52	2.94	3.20
Operator Labour	12.62	13.68	12.02	13.38
Miscellaneous	7.12	8.86	10.61	7.06
TOTAL VARIABLE COST	90.79	90.24	98.50	77.86
	1.82/bu.	1.19/bu.	3.07/bu.	0.78/bu.
CAPITAL COST				
Cash Rent/Crop Share	13.79	17.54	21.70	-
Taxes and Insurance	3.27	2.90	3.13	5.13
Equip., Bldg. Depreciation	27.24	29.20	28.54	32.93
Paid Capital Interest	8.95	8.45	8.12	13.97
TOTAL CAPITAL COST	53.26	58.09	61.49	52.02
TOTAL COST	144.05	148.32	159.99	129.88
	2.88/bu.	1.95/bu.	4.99/bu.	1.30/bu.
Return to Capital (Cont. Margin)	90.48	81.54	110.13	137.59
Return to Equity	37.22	23.45	48.64	85.57
Return to Equity (%)	6.87	4.04	8.43	8.49
Equity	82%	87%	87%	87%
Debt Capacity ($/Ac)	500.04	416.13	580.96	902.21
Productive Value of Land ($/Ac)	510.60	409.38	668.67	867.41
Market Value of Land ($/Ac)	758.55	761.04	745.07	784.46
Machinery Investment ($/Ac)	240.44	251.86	251.35	281.26

influenced to a greater degree not by the cost structure but rather by the value of production. Therefore, for any crop showing a high return it would be expected that a high yield and price is associated with it.

Due to the variation in the value of production, return to capital varied from $81.54 per acre for barley to $110.13 for canola. Returns to equity ranged from $23.45 for barley to $48.64 for canola. Expressed, as a percentage, returns to equity were 4.04, 6.87, and 8.43 per cent for barley, wheat and canola, respectively. The range in productive land value was from $409.38 for barley to $668.67 for canola.

Vermilion Region

Presented in Table 20 are costs and returns for the main crops surveyed in the Vermilion region. Canola and wheat production were equally important crops in 1985 in the Vermilion region as 61 wheat enterprises averaging 236.93 acres and 63 canola enterprises averaging 180.81 acres were analyzed for the 34 farms on study. Yields for the three main crops averaged 32.93 bushels for wheat, 45.19 bushels for barley and 22.75 bushels for canola. Value of production was the highest for canola at $143.69 per acre, followed by wheat at $120.96 per acre and then barley at $93.82 per acre.

The variable costs for canola were higher relative to wheat and barley due to higher material and crop insurance costs. Capital costs among the three main crops were quite similar with the exception of cash rent/crop share. Total production costs per acre amounted to $128.75 for wheat, $134.19 for barley and $139.45 for canola. Despite the high cost structure observed for canola it had the highest return to equity of $4.24 per acre or 0.91 per cent. Production costs exceeded returns for wheat and barley by $7.80 and $40.37 per acre, respectively.

The productive value of land for canola production was $231.30 per acre which was well below the average market value of $477.24 per acre. The study results obtained for the three most northerly regions (Peace River, Barrhead and Vermilion) were identical in that canola production was the most profitable enterprise followed by wheat and then barley.

TABLE 20

REGIONAL COMPARISON OF COSTS AND RETURNS FOR CROPS SURVEYED IN THE VERMILION REGION - 1985

	SPRING WHEAT	BARLEY	CANOLA	OATS
Number of Enterprise	61	42	63	8
Average Acreage	236.93	200.12	180.81	53.00
Average Yield (Bu./Acre)	32.93	45.19	22.75	65.38
	- - - - - - - -Dollars Per Acre- - - - - - - -			
Crop Sales	120.25	91.69	139.22	115.12
Insurance Receipts	0.71	2.12	4.47	0.84
VALUE OF PRODUCTION	120.96	93.82	143.69	115.95
	3.67/bu.	2.08/bu.	6.32/bu.	1.77/bu.
VARIABLE COST				
Materials	37.76	38.57	39.95	29.49
Hail/Crop Insurance	3.32	2.91	5.58	1.16
Fuel and Repairs	15.70	17.33	15.97	18.38
Paid Labour	2.86	2.95	2.76	4.27
Operator Labour	13.73	13.54	13.25	15.13
Miscellaneous	6.92	7.04	7.43	7.84
TOTAL VARIABLE COST	80.29	82.34	84.94	76.27
	2.44/bu.	1.82/bu.	3.73/bu.	1.17/bu.
CAPITAL COST				
Cash Rent/Crop Share	10.27	11.99	15.98	-
Taxes and Insurance	3.28	3.25	3.22	4.45
Equip., Bldg. Depreciation	36.01	26.66	25.26	27.88
Paid Capital Interest	8.90	9.95	10.04	10.38
TOTAL CAPITAL COST	48.47	51.85	54.50	42.71
TOTAL COST	128.75	134.19	139.45	118.98
	3.91/bu.	2.97/bu.	6.13/bu.	1.82/bu.
Return to Capital (Cont. Margin)	40.67	11.48	58.75	39.69
Return to Equity	-7.80	-40.37	4.24	-3.03
Return to Equity (%)	-1.53	-8.70	0.91	-0.48
Equity	84%	82%	82%	84%
Debt Capacity ($/Ac)	184.71	-25.64	269.37	239.99
Productive Value of Land ($/Ac)	60.34	-210.28	231.30	36.73
Market Value of Land ($/Ac)	477.83	467.65	477.24	428.50
Machinery Investment ($/Ac)	231.14	236.22	224.72	241.12

Red Deer Region

Spring wheat, barley and canola, were equally important crops in the Red Deer region as the acreage for each varied by less than 5 per cent. As indicated in Table 21, yields on these farms were below those reported in the more northern regions. Average yields in 1985 were 23.97, 43.08, and 19.59 bushels for wheat, barley and canola respectively. Canola had the highest value of production at $144.40 per acre.

The variable costs ranged from $83.70 per acre for spring wheat to $99.96 per acre for barley, with the difference accounted for by material inputs, fuel and repair costs. Less variation in the capital cost structures was observed among the three crops, ranging from $50.87 per acre for spring wheat to $56.63 per acre for barley. This variation is attributable to the land tenure arrangement (cash rent/crop share) among the crops and the imputed cost of machinery depreciation. To illustrate, the canola study group reported an average cash rent/crop share of $15.61 per acre and depreciation of $23.04 per acre, compared to the barley study group which had a cash rent/crop share expense of $9.54 per acre and depreciation of $30.17 per acre. The wide range in depreciation costs is a direct result of the machinery investment which ranged from $185.15 per acre for the farms with spring wheat to $267.94 for farms growing barley.

Total production costs were the highest for barley production at $158.58 per acre, followed by canola at $147.54 per acre. For barley this cost was $134.57 per acre. Relating these costs to the value of production, it is evident that returns from all the crops were insufficient to cover production costs. The magnitude of this difference was $3.13 per acre for canola, $33.25 per acre for wheat and $44.46 per acre for barley.

Equity levels for the eighteen farms on study varied as the spring wheat group had a 77 per cent equity level compared to 83 per cent for the barley group. Canola production was exclusive in having a positive productive land value which was calculated at $183.48 per acre, well below its market value of $601.76 per acre.

TABLE 21

REGIONAL COMPARISON OF COSTS AND RETURNS FOR CROPS SURVEYED IN THE RED DEER REGION - 1985

	SPRING WHEAT	BARLEY	CANOLA	OATS
Number of Enterprise	25	26	28	9
Average Acreage	279.64	252.72	205.94	59.11
Average Yield (Bu./Acre)	23.97	43.08	19.59	59.28
	- - - - - - - -Dollars Per Acre- - - - - - - -			
Crop Sales	89.51	91.25	116.36	93.63
Insurance Receipts	11.81	15.87	28.04	4.31
VALUE OF PRODUCTION	101.32	107.12	144.40	97.93
	4.23/bu.	2.49/bu.	7.37/bu.	1.65/bu.
VARIABLE COST				
Materials	42.52	46.51	44.30	27.15
Hail/Crop Insurance	4.44	7.58	9.13	3.36
Fuel and Repairs	12.95	17.64	15.04	17.51
Paid Labour	4.00	3.34	3.57	2.50
Operator Labour	8.89	10.91	10.04	12.85
Miscellaneous	10.90	13.98	11.51	7.67
TOTAL VARIABLE COST	83.70	99.96	93.59	71.04
	3.49/bu.	2.32/bu.	4.78/bu.	1.20/bu.
CAPITAL COST				
Cash Rent/Crop Share	13.94	9.54	15.61	10.05
Taxes and Insurance	3.01	4.40	3.42	3.95
Equip., Bldg. Depreciation	21.42	30.17	23.04	24.27
Paid Capital Interest	12.50	12.51	11.88	8.69
TOTAL CAPITAL COST	50.87	56.63	53.95	46.95
TOTAL COST	134.57	158.58	147.54	118.00
	5.61/bu.	3.68/bu.	7.53/bu.	1.99/bu.
Return to Capital (Cont. Margin)	17.62	7.16	50.81	26.89
Return to Equity	-33.25	-49.46	-3.13	-20.06
Return to Equity (%)	-8.31	-6.99	-0.60	-4.24
Equity	77%	83%	80%	81%
Debt Capacity ($/Ac)	4.56	-46.17	216.49	87.85
Productive Value of Land ($/Ac)	-112.67	-274.90	183.48	-24.84
Market Value of Land ($/Ac)	466.09	724.04	601.76	428.62
Machinery Investment ($/Ac)	185.15	267.94	204.19	208.41

Calgary (Oyen-Hanna) Region

As indicated earlier, over 51.2 per cent of the cultivated area on the study farms in the Calgary (Oyen-Hanna) area was in wheat production, most of which was grown on summerfallow. Although of much lesser importance, canola production was second followed by oats in terms of cultivated area seeded. The average yields shown in Table 22 were below average due to the drought conditions that prevailed during the 1985 growing period. Average yields for the three main crops were 16.2, 13.0, and 32.0 bushels for wheat, canola, and oats, respectively. As to the returns per acre, the value of production for wheat averaged $83.58, $83.46 for canola and $51.07 for oats.

Variable costs ranged from $45.59 per acre for oats to $59.44 per acre for barley. Of the total variable cost of $46.25 per acre reported for wheat, 65.2 per cent was attributable to material inputs and fuel and repairs. Most farmers in the Calgary (Oyen-Hanna) area consider their main cropping alternatives to be either wheat on summerfallow or wheat on stubble. Refer to Section V for an economic comparison of these crops which take into account observed summerfallow costs. The wide variation in the capital cost structure observed for the Calgary (Oyen-Hanna) farms was due mainly to the range in equity levels, the amount of rented land and machinery investment. Total production costs per acre for wheat averaged $75.62 compared to $107.47 for barley and $83.19 for oats.

Wheat production was exclusive in terms of profitability as its value of production exceeded its production costs by $7.96 per acre. Production costs exceeded barley returns by $24.01 per acre and oats returns by $32.12 per acre. The productive land value for wheat was $139.53 compared to its market value of $320.37 per acre.

Lethbridge Dryland Region

Similar to the Calgary (Oyen-Hanna) area, the Lethbridge dryland area is most suitable to drought resistant crops, as the lack of moisture

TABLE 22

REGIONAL COMPARISON OF COSTS AND RETURNS FOR CROPS SURVEYED IN THE CALGARY (OYEN-HANNA) REGION - 1985

	SPRING WHEAT	CANOLA	OATS
Number of Enterprise	20	4	5
Average Acreage	302.47	84.25	109.60
Average Yield (Bu./Acre)	16.20	13.00	32.00
	- - - - - - Dollars Per Acre- - - - -		
Crop Sales	76.57	83.46	51.07
Insurance Receipts	7.01	-	-
VALUE OF PRODUCTION	83.58	83.46	51.07
	5.16/bu.	6.42/bu.	1.60/bu.
VARIABLE COST			
Materials	17.56	29.98	14.48
Hail/Crop Insurance	2.88	-	2.91
Fuel and Repairs	12.61	13.64	12.64
Paid Labour	1.36	-	-
Operator Labour	7.86	10.82	9.47
Miscellaneous	3.98	5.00	6.09
TOTAL VARIABLE COST	46.25	59.44	45.59
	2.85/bu.	4.57/bu.	1.42/bu.
CAPITAL COST			
Cash Rent/Crop Share	1.96	13.21	7.33
Taxes and Insurance	1.65	1.57	2.12
Equip., Bldg. Depreciation	18.70	31.63	24.76
Paid Capital Interest	7.00	1.63	3.38
TOTAL CAPITAL COST	29.37	48.03	37.59
TOTAL COST	75.62	107.47	83.19
	4.67/bu.	8.27/bu.	2.60/bu.
Return to Capital (Cont. Margin)	37.34	24.02	5.47
Return to Equity	7.96	-24.01	-32.12
Return to Equity (%)	2.06	-5.14	-8.27
Equity	84%	95%	91%
Debt Capacity ($/Ac)	229.63	63.00	-27.10
Productive Value of Land ($/Ac)	139.53	-98.03	-221.00
Market Value of Land ($/Ac)	320.37	300.00	300.09
Machinery Investment ($/Ac)	164.96	281.48	215.81

is the main limiting factor in crop production. Like the Calgary (Oyen-Hanna) region wheat production accounts for about a one-half of the cultivated area while summerfallowing accounts for about a third. Canola production was more pronounced in the Lethbridge area and surprisingly in 1985 was able to generate higher per acre returns than spring wheat (see Table 23). Also presented are data for winter wheat and durum wheat. The 1985 per acre yields for the Lethbridge dryland region were 14.39 bushels for spring wheat, 19.25 bushels for barley, 8.83 bushels for canola, 17.35 bushels for winter wheat and 12.16 bushels for durum wheat. As indicated in Section II, crop insurance receipts on the 34 Lethbridge dryland study farms accounted for 30.3 per cent of the value of production. The value of production ranged from $71.93 per acre for winter wheat to $89.33 acre for canola.

The variable cost structure for wheat in general was slightly lower than that for barley and canola mainly because of lower material costs. Total variable costs ranged from $57.75 for winter wheat to $83.48 per acre for canola. Capital costs per acre varied from $23.98 for durum wheat production to $44.24 for canola. With the exception of canola, the proportion of rented land to owned land was small in the Lethbridge dryland area resulting in relatively low cash rent/crop share costs. This coupled with the high equity levels ranging from 82 to 91 per cent provided for a low capital cost structure. Total production costs ranged from $88.50 per acre for durum wheat to $127.72 per acre for canola.

Production costs exceeded returns for all crops surveyed in the Lethbridge dryland region. The shortfalls in returns ranged from $9.83 per acre for durum wheat to $38.39 per acre for canola. Machinery investment per acre ranged from $97.34 for durum wheat to $184.04 for barley production. In view of the 1985 production costs and commodity prices, all wheat enterprises showed higher net returns in relation to barley and canola.

The breakeven yields required to cover all production costs using 1985 commodity prices are 22.6 bushels for spring wheat, 23.4 bushels for winter wheat, 18.6 bushels for durum wheat, 54.1 bushels for barley and 19.6 bushels for canola.

TABLE 23

REGIONAL COMPARISON OF COSTS AND RETURNS FOR CROPS SURVEYED IN THE LETHBRIDGE (DRYLAND) REGION - 1985

CROP	SPRING WHEAT	BARLEY	CANOLA	WINTER WHEAT	DURUM WHEAT
Number of Enterprise	34	12	19	17	19
Average Acreage	248.09	147.25	153.33	193.65	321.21
Average Yield (Bu./Acre)	14.39	19.25	8.83	17.35	12.16
			-Dollars Per Acre-		
Crop Sales	58.93	44.32	45.03	62.15	55.72
Insurance Receipts	24.67	36.61	44.30	9.77	22.95
VALUE OF PRODUCTION	83.60	80.93	89.33	71.93	78.67
	5.81/Bu.	4.20/Bu.	10.12/Bu.	4.15/Bu.	6.47/Bu.
VARIABLE COST					
Materials	19.85	23.91	37.38	15.98	24.32
Hail/Crop Insurance	5.02	4.82	6.10	2.94	4.50
Fuel and Repairs	14.78	14.97	13.22	15.68	13.01
Paid Labour	1.28	1.52	0.51	0.50	0.68
Operator Labour	12.99	19.11	14.88	11.76	6.68
Miscellaneous	10.59	8.36	11.39	10.89	15.33
TOTAL VARIABLE COST	64.51	72.69	83.48	57.75	64.52
	4.48/Bu.	3.78/Bu.	9.45/Bu.	3.33/Bu.	5.31/Bu.
CAPITAL COST					
Cash Rent/Crop Share	3.61	5.87	20.91	7.53	5.61
Taxes and Insurance	3.07	3.20	2.95	3.29	2.70
Equip., Bldg. Depreciation	19.25	21.66	17.13	17.28	12.15
Paid Capital Interest	5.57	8.52	3.25	7.84	3.51
TOTAL CAPITAL COST	31.50	39.25	44.24	35.94	23.98
TOTAL COST	96.01	111.94	127.72	93.69	88.50
	6.67/Bu.	5.82/Bu.	14.46/Bu.	5.40/Bu.	7.28/Bu.
Return to Capital (Cont. Margin)	19.09	8.24	5.84	14.18	14.15
Return to Equity	-12.41	-31.01	-38.39	-21.76	-9.83
	-2.31%	-5.34%	-10.03%	-5.54%	-1.97%
Equity	89%	87%	91%	82%	91%
Debt Capacity ($/Ac)	84.50	-5.68	-122.69	22.86	39.73
Production Value of Land ($/Ac)	-42.58	-162.50	-140.62	-72.67	-19.69
Market Value of Land ($/Ac)	500.49	587.58	562.32	487.29	492.14
Machinery Investment ($/Ac)	164.47	184.04	145.56	150.32	97.34

SECTION VII

A COST COMPARISON OF CROP PRODUCTION BY LAND TENURE

With the cost of farm machinery escalating many farmers have turned to renting land either to justify the purchase of farm equipment or to increase their overall farm income. Secondly, with land being considered the most expensive capital resource many farmers have channelled their limited money supply to the purchase of farm equipment thereby increasing the need to cash rent or crop share. As is usually the case, a relatively high cost structure is associated with newly purchased land, especially if the equity level is low. In such cases, the interest paid per purchased acre will exceed the cash rent/crop share cost per acre of rented land. Table 24 attempts to show how the equity level and interest rate affects the debt servicing cost per acre.

TABLE 24

DEBT SERVICING REQUIREMENTS FOR A TYPICAL LAND PURCHASE

Example A: $80,000 Land Purchase Price for 160 Areas 12% and 20 Year Term

Equity	10%	20%	30%	40%	50%	60%
	----------Dollars----------					
Amount of Loan	72,000	64,000	56,000	48,000	40,000	32,000
Annual Debt Serv. Req.	9,640	8,569	7,498	6,427	5,355	4,284
Debt Servicing/Acre	60.25	53.56	46.86	40.17	33.47	26.78

Example B: $80,000 Land Purchase Price for 160 Areas 9% and 20 Year Term

Equity	10%	20%	30%	40%	50%	60%
	----------Dollars----------					
Amount of Loan	72,000	64,000	56,000	48,000	40,000	32,000
Annual Debt Serv. Req.	7,887	7,010	6,134	5,258	4,382	3,505
Debt Servicing/Acre	49.30	43.82	38.34	32.86	27.39	21.91

In general, it can be said that the actual cash rent/crop share values observed in 1985 were about equal to the debt servicing requirements at the 50 per cent equity level.

Table 25 presents a summary of land tenure by region for the average farm participating in the crop case study in 1985. The portion of rented land to total acres farmed ranged from 18.2 per cent in the Lethbridge irrigation region to 51.8 per cent in the Barrhead region.

TABLE 25

SUMMARY OF LAND TENURE BY REGION - 1985

Region	Cultivated Acres	Rented Acres	Owned Acres	Rented Acres As % of Total Acres
Peace River	914.6	287.2	627.4	31.4
Barrhead	1368.5	709.2	659.3	51.8
Vermilion	1216.9	448.1	768.8	36.8
Red Deer	1291.7	424.0	867.7	32.8
Calgary (Oyen-Hanna)	1798.9	384.1	1414.8	21.4
Lethbridge Dryland	1057.6	318.3	739.3	30.1
Lethbridge Irrigation	590.1	107.4	482.7	18.2

This section is intended to observe the actual cost difference in the production of grain/oilseeds on owned land versus rented land. Assuming similar yields for both types of land tenure, per acre variable costs are expected to be similar. However, the actual capital cost structure is expected to be quite substantial for rented versus owned land. This is especially the case when the cash rent/crop share cost per acre is greater than the paid capital interest reported by high equity farm with owned land. A general observation in this study was that yields were lower on rented land versus owned land. Possible reasons for this are:

1. less use of fertilizers and chemicals on rented land;
2. more timely field operations on owned land;

3. varying cultural practices by different tenants over time;
4. tendency to intensify management and cultural skills on owned land versus rented; and
5. generally, due to the unfamiliarity with newly acquired rented land, management "know-hows" are not optimized.

Tables 26 to 30 inclusive provide cost comparisons for grain production by land tenure for selected regions having an adequate number of study participants. Data for the Calgary (Oyen-Hanna) and Peace River regions are not provided in this section due to the small number of farms surveyed.

Table 26 summarizes the costs and returns for wheat, barley, and canola by land tenure in the Barrhead region. With the high productivity reported in this region, the value of cash rent/crop share was well above the average reported in other areas ranging from $26.59 per acre for wheat to $41.41 per acre for canola. With the exception of barley, yields and value of production were higher for wheat and canola grown on rented land. As a general observation, farms with rented land were larger in size and thus experienced cost savings in areas such as fuel, repairs, and labour. The cash rent/crop share costs associated with rented land accounted for 45 to 54 per cent of the relatively higher capital costs. The returns to equity on owned land versus rented land were generally higher for all crops ranging from $27.06 for wheat to $60.00 per acre for canola.

As indicated in Table 27, higher yields and values of production were reported for all crops grown on owned land in the Vermilion region. Variable costs were reported to be consistently higher for owned land with material inputs, labour, fuel and repair costs accounting for most of the difference. The cash rent/crop share cost ranged from $29.47 per acre for barley and wheat to $31.77 for canola. Once again, this cost on rented land was partially offset by lower taxes, insurance, depreciation, and paid capital interest costs. The actual difference in the capital cost structure for rented land versus owned land ranged from $4.33 per acre for barley to $13.32 per acre for wheat. In conclusion, the higher net return for crops grown on owned land was mostly as a

result of higher yields and returns as opposed to the lower cost structure.

In contrast to the previous observations, the value of production for all crops grown in the Red Deer region on rented land were higher than that for owned land (Table 28). Total variable costs were consistently higher on rented land ranging from $87.75 per acre for wheat to $106.92 per acre for barley. A narrow range in the capital cost structure was observed on rented land, from $58.59 per acre for canola to $65.45 for barley. As to total production costs, the high cash rent/crop share cost was partially offset by the lower costs for taxes, insurance, depreciation and paid capital interest. Despite the higher values of production for the crops grown on rented land, returns to equity were consistently higher for crops grown on owned land. As anticipated, the farms with the rented crops had significantly lower interest costs and machinery investment on a per acre basis.

Table 29 presents costs and returns data by land tenure for five different crops surveyed in the Lethbridge dryland region. In general, yields and the value of production were observed to be higher on owned land. Significant yield differences were also noted for durum wheat, barley, and canola. Canola production was observed to have the highest value of production on owned land while winter wheat had the highest value on rented land. No general conclusion can be drawn as to material costs or variable costs on owned land versus rented land. As can be seen, the capital cost structure was consistently lower on owned land versus rented land. In agreement with the results from other regions, the cost of cash rent/crop share was partially offset by lower costs in the area of taxes, insurance, depreciation and paid capital interest.

Differences in the costs and returns structure by land tenure for irrigated soft wheat and alfalfa hay can be observed in Table 30. With respect to soft wheat, there was no significant difference in terms of yield, value of production or total production costs. The cash rent/crop share cost of $67.66 was largely offset by lower fuel/repair costs, cash overhead, depreciation and paid capital interest. The net result was a difference of $0.67 in the total production costs for the two types of systems. Regarding returns to equity, both systems had production

costs exceeding returns, with the shortfall averaging $69.71 per acre on owned land and $78.15 on rented land. Farms with soft wheat on owned land had an equity of $1159.17 per acre compared to $454.71 per acre for farms with rented land.

Alfalfa hay production was profitable for both types of systems. Similar to soft wheat production, the cash rent/crop share value of $68.29 per acre on rented land was largely offset by lower costs for taxes, insurance, depreciation, and paid capital interest. Lower production costs along with a slightly higher yield resulted in alfalfa on owned land showing a return to equity of $135.13 per acre compared to $97.76 per acre for the rented alfalfa. The farms with owned alfalfa had an equity of $1,152.89 per acre compared to $301.71 on rented land. Machinery investment for alfalfa on owned land was $543.60 per acre while for alfalfa on rented land it was $319.26 per acre.

TABLE 26

SUMMARY OF COSTS AND RETURNS FOR CROPS BY LAND TENURE - 1985 BARRHEAD REGION

	WHEAT		BARLEY		CANOLA	
	OWNED	RENTED	OWNED	RENTED	OWNED	RENTED
Number of Farms	9	6	25	23	15	17
Average Acreage	215.78	261.62	263.16	417.59	226.47	219.94
Yield (Bu./Acre)	46.11	54.36	77.02	74.63	31.33	32.68
	- - - - - - - - - - - -		-Dollars Per Acre-		- - - - - - - - - - - -	
Crop Sales	165.00	195.02	194.65	154.67	201.05	214.37
Insurance Receipts	0.53	0.85	0.19	0.58	0.23	0.94
VALUE OF PRODUCTION	165.54	195.87	194.84	155.26	201.28	215.32
VARIABLE COST						
Materials	48.72	48.51	43.40	44.24	48.83	52.62
Fuel/Repairs	16.44	16.91	16.60	16.70	16.05	17.46
Operator Labour	13.82	11.52	16.10	11.95	12.22	11.84
Miscellaneous	13.78	12.02	17.63	14.85	19.06	18.72
TOTAL VARIABLE COST	92.76	88.96	93.73	87.74	96.16	100.64
CAPITAL COST						
Cash Rent/Crop Share	-	26.59	-	30.10	-	41.41
Taxes and Insurance	5.57	1.14	5.41	1.11	5.45	1.03
Bldg., Equip. Depreciation	25.58	28.79	31.73	27.38	27.89	29.12
Paid Capital Interest	14.58	3.74	13.02	5.19	11.78	4.79
TOTAL CAPITAL COST	45.73	60.25	50.15	63.77	45.12	76.36
TOTAL COST	138.48	149.21	143.88	151.51	141.28	177.00
Return to Capital	72.78	106.91	101.11	67.52	105.12	114.68
Return to Equity	27.06	46.65	50.96	3.75	60.00	38.32
Equity	814.02	285.66	1020.06	265.06	905.72	277.03
	79%	89%	87%	86%	87%	86%
Machinery Investment	225.00	254.76	269.22	239.43	241.45	260.35

TABLE 27

SUMMARY OF COSTS AND RETURNS FOR CROPS BY LAND TENURE - 1985 VERMILION REGION

	WHEAT STUBBLE OWNED	WHEAT STUBBLE RENTED	BARLEY STUBBLE OWNED	BARLEY STUBBLE RENTED	CANOLA STUBBLE OWNED	CANOLA STUBBLE RENTED
Number of Farms	28	23	26	12	25	11
Average Acreage	307.04	207.87	183.65	274.08	184.92	245.45
Yield (Bu./Acre)	33.24	29.72	44.76	43.45	19.24	17.82
	- - - - - - - - - - - - -Dollars Per Acre- - - - - - - - - - - - -					
Crop Sales	122.50	109.01	94.61	85.79	116.52	105.99
Insurance Receipts	0.90	0.52	2.27	2.13	5.53	9.39
VALUE OF PRODUCTION	123.40	109.53	96.87	87.72	122.05	115.38
VARIABLE COST						
Materials	39.20	37.64	37.46	41.71	45.37	42.85
Fuel/Repairs	16.04	14.97	18.51	15.71	17.03	14.35
Operator Labour	14.14	12.64	15.04	10.89	14.24	11.06
Miscellaneous	13.70	12.75	13.15	12.61	16.55	15.26
TOTAL VARIABLE COST	83.08	78.00	84.16	80.92	93.19	83.52
CAPITAL COST						
Cash Rent/Crop Share	-	29.47	-	29.47	-	31.77
Taxes and Insurance	4.27	1.31	4.88	0.87	4.47	0.79
Bldg., Equip. Depreciation	28.92	21.14	31.57	19.60	26.72	18.46
Paid Capital Interest	10.68	5.27	13.83	4.67	16.86	4.46
TOTAL CAPITAL COST	43.87	57.19	50.28	54.61	48.05	55.47
TOTAL COST	126.95	135.19	134.43	135.54	141.24	138.99
Return to Capital	40.32	31.53	12.72	6.99	28.85	31.86
Return to Equity	-3.55	-25.66	-37.56	-47.62	-19.20	-23.61
	-0.53%	-14.13%	-5.71%	-27.39%	-3.22%	-14.72%
Equity	676.51	181.52	655.92	174.60	595.29	159.64
	85%	78%	82%	81%	77%	79%
Machinery Investment	255.6	190.12	277.54	176.47	236.83	167.06

TABLE 28

SUMMARY OF COSTS AND RETURNS FOR CROPS BY LAND TENURE - 1985 RED DEER REGION

	WHEAT STUBBLE OWNED	WHEAT STUBBLE RENTED	CANOLA STUBBLE OWNED	CANOLA STUBBLE RENTED	BARLEY STUBBLE OWNED	BARLEY STUBBLE RENTED
Number of Farms	13	9	14	8	14	9
Average Acreage	294.27	300.89	197.15	218.75	308.92	229.00
Yield (Bu./Acre)	21.28	25.91	16.78	19.61	45.19	41.21
	-Dollars Per Acre-					
Crop Sales	80.40	103.08	84.09	110.21	87.66	93.27
Insurance Receipts	19.59	3.42	36.83	19.58	15.95	14.73
VALUE OF PRODUCTION	99.99	106.49	120.93	129.79	103.61	107.99
VARIABLE COST						
Materials	40.55	46.39	47.54	47.07	47.18	46.68
Fuel/Repairs	13.34	12.20	15.25	16.57	17.01	19.77
Operator Labour	9.81	7.35	10.73	8.24	11.26	10.11
Miscellaneous	17.73	21.81	23.86	27.15	22.88	30.36
TOTAL VARIABLE COST	81.43	87.75	97.38	99.03	98.33	106.92
CAPITAL COST						
Cash Rent/Crop Share	-	31.66	-	33.18	-	34.60
Taxes and Insurance	4.79	0.89	5.06	1.12	5.63	1.42
Bldg., Equip. Depreciation	21.82	21.43	24.72	20.17	31.74	26.38
Paid Capital Interest	16.12	8.30	18.10	4.13	16.36	3.05
TOTAL CAPITAL COST	42.73	62.28	47.89	58.59	53.73	65.45
TOTAL COST	124.16	150.03	145.27	157.61	152.06	172.37
Return to Capital	18.56	18.75	23.54	30.77	5.28	1.08
Return to Equity	-24.17	-43.53	-24.34	-27.82	-48.45	-64.37
	-4.16%	-23.73%	-3.23%	-15.33%	-5.46%	-25.27%
Equity	579.00	182.23	750.39	186.70	887.10	255.63
	78%	72%	78%	83%	82%	88%
Machinery Investment	197.30	175.41	220.49	184.41	281.78	237.09

TABLE 29

SUMMARY OF COSTS AND RETURNS FOR CROPS BY LAND TENURE - 1985 LETHBRIDGE (DRYLAND) REGION

	SPRING WHEAT		WINTER WHEAT		DURUM WHEAT	
	OWNED	RENTED	OWNED	RENTED	OWNED	RENTED
Number of Farms	24	10	12	5	13	6
Average Acreage	275.25	182.90	179.75	227.00	374.85	205.00
Yield (Bu./Acre)	15.13	12.62	16.83	18.60	13.69	8.83
	- - - - - - - - - - - - -Dollars Per Acre- - - - - - - - - - - - -					
Crop Sales	64.05	40.44	57.12	71.72	60.21	37.95
Insurance Receipts	20.10	41.15	8.25	12.67	18.04	42.37
VALUE OF PRODUCTION	84.15	81.59	65.37	84.39	78.25	80.32
VARIABLE COST						
Materials	19.75	20.21	15.18	17.51	27.06	13.51
Fuel/Repairs	15.14	13.50	16.53	14.06	12.85	13.64
Operator Labour	13.11	12.58	11.87	11.54	5.65	10.55
Miscellaneous	16.91	16.77	15.29	12.51	19.37	25.20
TOTAL VARIABLE COST	64.91	63.06	58.87	55.62	64.93	62.90
CAPITAL COST						
Cash Rent/Crop Share	-	16.65	-	21.84	-	27.85
Taxes and Insurance	3.62	1.09	4.45	1.09	3.09	1.17
Bldg., Equip. Depreciation	19.39	18.71	17.02	17.79	12.59	10.75
Paid Capital Interest	6.47	2.31	10.75	2.31	3.64	3.00
TOTAL CAPITAL COST	29.49	38.77	32.21	43.02	19.24	42.77
TOTAL COST	94.40	101.83	91.08	98.65	84.17	105.67
Return to Capital	19.24	18.54	6.50	28.76	13.32	17.42
Return to Equity	-10.25	-20.23	-25.71	-14.26	-5.92	-25.35
	-1.62%	-10.64%	-5.09%	-8.03%	-0.99%	-24.57%
Equity	636.79	191.03	506.77	177.68	600.11	103.39
	89%	91%	81%	90%	92%	81%
Machinery Investment	164.53	164.27	146.12	158.30	99.87	87.32

TABLE 29: CONT'D

SUMMARY OF COSTS AND RETURNS FOR CROPS BY LAND TENURE -
1985 LETHBRIDGE (DRYLAND) REGION

	CANOLA		BARLEY	
	OWNED	RENTED	OWNED	RENTED
Number of Farms	5	4	8	4
Average Acreage	102.00	217.50	160.87	120.00
Yield (Bu/Acre)	12.00	4.88	22.50	12.75
	- - - - - - - - - - - -Dollars Per Acre- - - - - - - - - - - -			
Crop Sales	79.19	25.01	44.92	42.71
Insurance Receipts	30.09	52.62	36.20	37.72
VALUE OF PRODUCTION	109.28	77.63	81.12	80.43
VARIABLE COST				
Materials	19.36	45.43	25.65	19.26
Fuel/Repairs	14.24	12.63	16.11	11.91
Operator Labour	17.32	13.45	19.94	16.88
Miscellaneous	18.83	20.03	15.62	12.22
TOTAL VARIABLE COST	69.75	91.54	77.32	60.27
CAPITAL COST				
Cash Rent/Crop Share	-	33.16		21.63
Taxes and Insurance	5.57	1.41	3.97	1.15
Bldg. Equip. Depreciation	22.53	13.97	22.68	18.93
Paid Capital Interest	6.57	1.30	11.32	1.00
TOTAL CAPITAL COST	34.67	49.85	37.97	42.70
TOTAL COST	104.41	141.39	115.29	102.97
Return to Capital	39.54	-13.91	3.80	20.16
Return to Equity	4.87	-63.76	-34.17	-22.53
	0.61%	-46.96%	-4.73%	-11.16%
Equity	803.52	135.24	719.22	202.42
	93%	86%	86%	96%
Machinery Investment	185.58	122.10	190.14	167.67

TABLE 30

SUMMARY OF COSTS AND RETURNS FOR CROPS BY LAND TENURE -
1985 LETHBRIDGE (IRRIGATION) REGION

	SOFT WHEAT		ALFALFA HAY	
	OWNED	RENTED	OWNED	RENTED
Number of Farms	39	19	20	8
Average Acreage	291.51	116.47	96.45	68.38
Yield (Bu/Acre)	82.74	81.84	3.98 Ton	3.83 Ton
	-Dollars Per Acre-			
Crop Sales	264.49	256.94	341.78	317.87
Insurance Receipts	0.33	0.10	-	-
VALUE OF PRODUCTION	264.82	257.04	341.78	317.87
VARIABLE COST				
Materials	65.21	63.71	15.31	39.26
Fuel/Repairs	52.25	49.56	28.98	32.37
Operator Labour	36.23	35.15	17.38	17.13
Miscellaneous	204.28	198.27	91.10	110.55
TOTAL VARIABLE COST	69.75	91.54	77.32	60.27
CAPITAL COST				
Cash Rent/Crop Share	-	67.66	-	68.29
Taxes and Insurance	18.77	3.88	16.24	2.25
Bldg. Equip. Depreciation	61.85	52.33	57.79	33.50
Paid Capital Interest	49.63	13.06	41.52	5.52
TOTAL CAPITAL COST	130.24	136.92	115.56	109.56
TOTAL COST	334.52	335.19	206.65	220.11
Return to Capital	60.54	58.77	250.68	207.32
Return to Equity	-69.71	-78.15	135.13	97.76
	-6.05%	-0.93%	11.69%	32.31%
Equity	1159.17	454.71	1152.89	301.71
	71%	80%	74%	86%
Machinery Investment	563.43	478.26	543.60	319.26